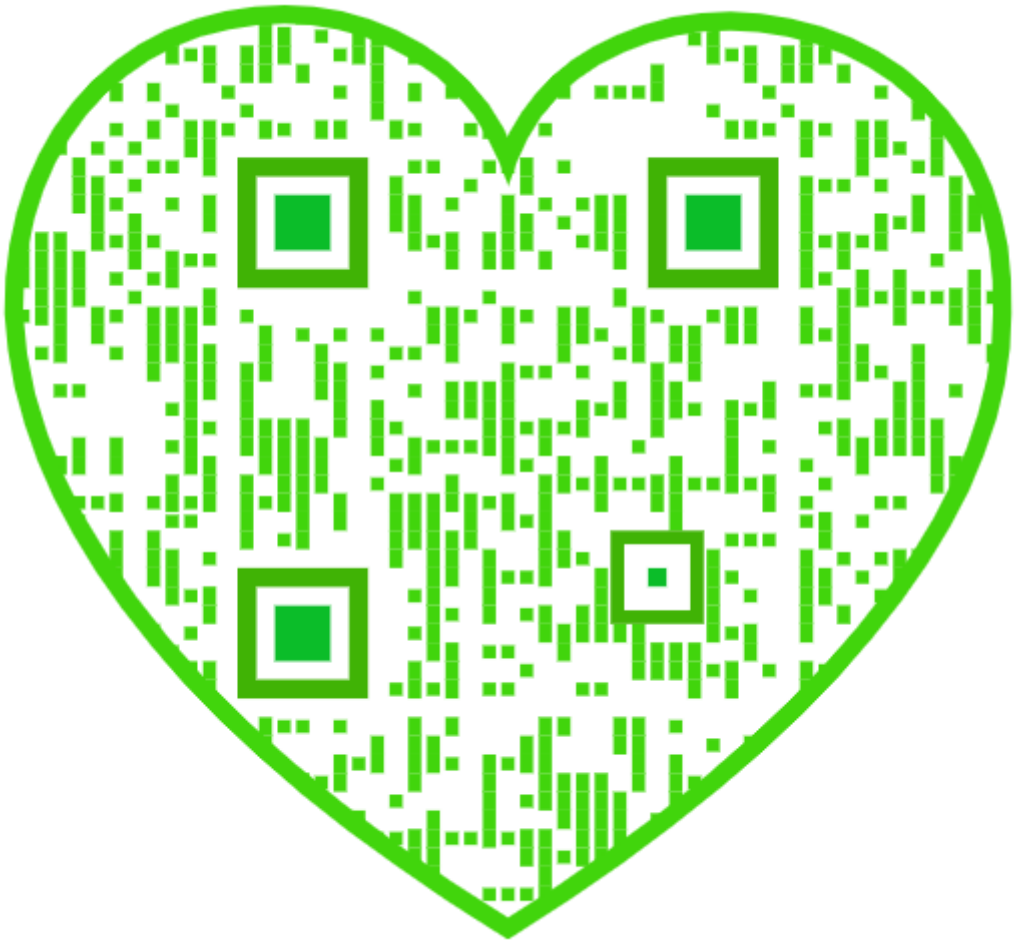


P
Med
A

TRANSACTIONS

OF THE

SEVENTEENTH ANNUAL MEETING

OF THE

AMERICAN LARYNGOLOGICAL ASSOCIATION

HELD IN THE CITY OF ROCHESTER, N. Y.

JUNE 17, 18, AND 19

1895

98144

414991
30.8.43

NEW YORK
D. APPLETON AND COMPANY
1896

LIBRARY
COLLEGE OF
PHYSICIANS AND SURGEONS
SAN FRANCISCO
CALIF.
SCHOOL OF DENTISTRY

APR 27 '34

003486
RF
1
A5
v.17

TRANSFERRED TO ST. LOUIS MEDICAL
LIBRARY ASSOCIATION, 1906.

QT JJ
S J5

PRESIDENTS OF THE ASSOCIATION

ELECTED.	
1879.	LOUIS ELSBERG, M. D.
1880.	J. SOLIS-COHEN, M. D.
1881.	FREDERICK I. KNIGHT, M. D.
1882.	GEORGE M. LEFFERTS, M. D.
1883.	F. H. BOSWORTH, M. D.
1884.	E. L. SHURLY, M. D.
1885.	HARRISON ALLEN, M. D.
1886.	E. FLETCHER INGALS, M. D.
1887.	R. P. LINCOLN, M. D.
1888.	E. CARROLL MORGAN, M. D.
1889.	JOHN N. MACKENZIE, M. D.
1890.	W. C. GLASGOW, M. D.
1891.	S. W. LANGMAID, M. D.
1892.	MORRIS J. ASCH, M. D.
1893.	D. BRYSON DELAVAN, M. D.
1894.	JOHN O. ROE, M. D.

OFFICERS

(Elected June 1, 1894)

PRESIDENT

JOHN O. ROE, M. D., Rochester

1st VICE-PRESIDENT

C. C. RICE, M. D., New York

2d VICE-PRESIDENT

S. H. CHAPMAN, M. D., New Haven

SECRETARY AND TREASURER

CHARLES H. KNIGHT, M. D., 147 West Fifty-seventh Street, New York

LIBRARIAN

J. H. BRYAN, M. D., Washington, D. C.

COUNCIL

W. C. GLASGOW, M. D., St. Louis
S. W. LANGMAID, M. D., Boston
MORRIS J. ASCH, M. D., New York
D. BRYSON DELAVAN, M. D., New York

TABLE OF CONTENTS

PAGE

Address of the President, Dr. Roe 1

Papers :

I. Foreign Bodies in the Œsophagus: Specially considered from the Points of View of Symptomatology and Morbid Anatomy. Dr. Allen 8

II. The Treatment of Goitre and Exophthalmic Goitre by Thyreoid Extracts and Desiccated Thyreoids. Drs. Ingals and Ohls . 24

III. The Influence of Chronic Disease of the Throat upon Certain Defects of Speech, especially Stammering. Dr. Delavan . . 43

IV. Electrolysis by a Current Controller for the Reduction of Spurs of the Nasal Septum. Dr. Casselberry 46

V. Is Acute Amygdalitis in any Way Dependent on the Rheumatic Diathesis? Dr. Hope 58

VI. Some Remarks on Removal of the Tonsils. Dr. Farlow . . 60

VII. A Case of Polypoid Lipoma of the Larynx. Dr. Farlow . . 65

VIII. A Case of Melancholia Dependent upon Ethmoid Disease and Cured by Intranasal Operation. Dr. Bosworth . . . 72

IX. A Case of Suppurative Ethmoid Disease followed by Invasion of the Sphenoidal Sinus, Abscess of the Brain, and Death. Dr. Bosworth 74

X. A Further Contribution to the Study of Suppurative Disease of the Accessory Sinuses, with Report of Cases. Dr. Bryan . . 76

XI. A Consideration of some of the More Important Principles of Intranasal Surgery. Dr. Simpson 94

XII. Ludwig's Angina. Dr. Newcomb 101

XIII. Tuberculosis of the Upper Air-passages.—Ætiology. Dr. Wright 110

XIV. The Diagnosis of Tuberculosis of the Upper Air-passages. Dr. Rice 120

XV. Surgical Treatment of Laryngeal Tuberculosis. Dr. Gleitsmann . 132

XVI. Cyst of the Maxillary Sinus. Dr. Knight 159

XVII. Necrosis of the Middle Turbinate. Dr. Thrasher . . . 164

XVIII. Congenital Osseous Stenosis of the Naris. Dr. Thrasher . . 170

XIX. A Cyst of the Nasopharynx and a Cyst of the Oropharynx. Dr. Wright 171

PAGE

XX. A True Papilloma or Papillary Fibroma of the Nasal Septum. Dr. Wright 177

XXI. The Relation of Vaso-motor Disturbances to Diseases of the Upper Air-tract. Dr. Bosworth 180

XXII. Compensatory Arytænoid Movement. Dr. Porter. . . 190

XXIII. The Cigarette Habit. Dr. Mulhall 192

XXIV. Nasal Characteristics, Human and Comparative. Dr. Ward . 200

Presentation of Instruments.

An Improved Conchotome. Dr. Gleitsmann 219

Mouth-breathers. Dr. Farlow 220

A Modification of the Gradle Forceps. Dr. Asch . . . 221

Bors's Laryngeal Dilator Dr. Asch 221

A New Spray Cut-off. Dr. Shurly 222

Instruments for Use in Ingals's Operation on Deviated Septum. Dr. Daly 223

An Improved Cartilage Knife. Dr. Coolidge, Jr. . . . 224

A Converter for the Alternating Current. Dr. Mulhall . . 224

A Mult-aural Stethoscope. Dr. Lowman 224

Business Meetings 225

Obituary. Dr. William Chapman Jarvis 229

List of Fellows, 1896 231

TRANSACTIONS

OF THE

SEVENTEENTH ANNUAL MEETING

OF THE

AMERICAN LARYNGOLOGICAL ASSOCIATION,

HELD AT ROCHESTER, N. Y., JUNE 17, 18, AND 19, 1895.

ADDRESS OF THE PRESIDENT.

By JOHN O. ROE, M. D.

In performing the pleasant duty of announcing the opening of the seventeenth annual congress of this society, I must first express to you my appreciation of the high honor which you have conferred upon me. To be elected president of this association is an honor which every member should justly prize, no matter whether tendered him because of his having been born great, or having achieved greatness, or, like Malvolio, having had greatness thrust upon him.

It becomes my pleasant privilege as your presiding officer to extend to you in my own behalf, in behalf of our medical profession, and in behalf of our city, a very cordial welcome to Rochester, with the hope that your stay with us will be both pleasant and profitable.

A glance at our ample and attractive programme assures us that the meeting can not fail to be intellectually profitable, and this outing and respite from our daily professional work can not be otherwise than physically beneficial.

But it is in another way that these annual gatherings are a lasting source of pleasure and profit, and it is on another account that we look forward to them with pardonable enthusiasm. It is the hearty good-fellowship in this way maintained between the members, whereby old ties become more firmly cemented and new friendships

formed, that makes these meetings a lasting source of happiness. Also during our social interchange of the results of personal experience many valuable hints and much food for thought are often suggested that do not find place in the most carefully prepared papers and general discussions.

I will not detain you with any remarks relating to the general progress of the society, since its work was so ably and fully reviewed by the president last year. I can not, however, refrain from saying that the great advantage derived by the members from association in organized and specialized medical bodies can not be better illustrated than by the achievements of this society since its organization; and such achievements can result only from the permanent enthusiasm and punctual attendance of each and every member. Much can be said commendatory of the good work accomplished during the past year by many of its members, and also by those who are working in this department in other parts of the world; but it is familiar to you all and its recital is unnecessary. One of the most notable advances, however, made in experimental medicine relates to our department of science and is worthy of notice. It is the production of antitoxine, the most potent destroyer of the diphtheria germ yet discovered, as the excellent results obtained from its use clearly show.

Without further preliminary remarks I will call your attention for a few moments to some observations on the relation of damp air to diseases of the air-passages, with reference to the prevalence of these diseases in the lake region.

It may be said that no region of the earth with which we are acquainted has all the elements conducive to the perfect health of every organ. In those regions in which the climate is conducive to perfect health in one organ or set of organs, the same climate may be prejudicial to the maintenance of perfect health in other organs. For instance, in those regions in which the climatological conditions are conducive to a healthful condition of the respiratory organs the conditions may be directly or indirectly unfavorable to a heathful condition of the hepatic organs, or *vice versa*. This fact may be explained by the two disturbing influences which climate may exercise upon the health: first, the direct detrimental effect of the atmospheric conditions upon certain organs; and, secondly, the effect of the climatic conditions upon the habits and customs of the persons themselves, which habits in turn lead to derangements and finally to diseases of certain organs. For instance, persons

living in a cold and stimulating climate are continually induced to subject themselves to imprudent exposures which are conducive to diseases of the respiratory organs, whereas persons living in a hot and sedative climate are inclined to lead a languid and indolent life, which is especially conducive to disorders and diseases of the biliary system.

The climate of the region of the Great Lakes, as is well known, is especially productive of diseases of the nose, throat, and lungs, and a comparative freedom from disease of the biliary and circulatory organs, as statistical reports clearly show. The principal climatic condition of this section that causes this proclivity to disease of the air-passages is the humidity and dampness of the atmosphere, associated with frequent, sudden, and often extreme variations in temperature, together with a lowered mean annual temperature.

The amount of humidity and dampness of the atmosphere of a region is influenced by a variety of conditions:

1. The nature and cultivation of the soil, the configuration of the surface, and the amount of forests.

2. Its elevation and temperature.

3. Its position with reference to the sea, large inland lakes, hot deserts, or cold regions, and the prevailing winds.

The nature of the soil has also much to do with the amount of moisture suspended in the atmosphere. If the soil is light and sandy, so that the surface water, after showers or rains, is readily drained away, leaving the ground dry, but little moisture remains in the atmosphere; whereas if the soil is heavy and underlaid with clay, so as to prevent rapid drainage, the air will become more or less damp. This is especially illustrated by the Adirondack region, which is filled with small lakes and ponds and has frequent showers and much rain, but at the same time the soil is so porous and sandy that the surface water is drained away at once, leaving the soil in a short time after a heavy shower quite dry. I have noticed this same condition in the Bermuda Islands, which are characterized by a very porous coral formation, and, although the air is a moist sea air, it is at the same time free from that condition termed dampness.

One of the most important problems in sanitary science is the adoption of perfect drainage of the soil, which has the effect to raise its temperature from a degree and a half to three degrees. Soil that is well drained and cultivated hence imparts less moisture to the air than uncultivated and forest land. In the lake region the soil is

varied, and to a large extent highly cultivated. In some portions it is quite sandy, while in others it is heavy and underlaid with clay and rock, so that where artificial drainage is not thoroughly employed much dampness of the soil prevails.

The surface of this region is rolling and undulating, but quite free from hilly districts and devoid of mountainous regions with their attendant effects upon the climate. This section is, however, moderately elevated above the sea, having an altitude of about five hundred feet, which renders it more healthful than tide-water lands, but at the same time gives it a correspondingly lower mean annual temperature.

In an elevated region, other things being equal, the temperature falls at the rate of one degree for every three hundred feet of ascension, and as we recede from the equator the mean annual temperature is one degree lower for every geographical degree.

The salutary effect of altitude is due to the increased activity of the circulation of the respiratory organs, and the accompanying increased elimination of watery vapor from the bronchial mucous membrane, thereby preventing turgescence and the retention of detritus in these parts. This beneficial effect may, however, be largely interfered with if the air is charged with vapor and subject to frequent variations in temperature.

The condition which mainly affects the climate of this region is the chain of great lakes that derive much of their water from the colder regions of the north. This water, as it passes downward to the sea, has a chilling effect on the surrounding atmosphere, condensing its moisture into fogs, mist, and rain, and causing a lowering of the mean annual temperature. The mean annual temperature of Buffalo is the same as that of Rochester—40° F.—while that of Albany is three degrees higher, although in the same latitude, and is for the spring months nearly six degrees higher than our own locality. The chilling of the air by this large body of cold water passing through Lake Erie and Lake Ontario is also the cause of the frequent and rapid changes of temperature which in this region are experienced, especially during the spring months. The early warm days in the spring are invariably followed by chilling blasts from the north, which are the result of the heated air rising and causing rapid evaporation from the land, and a corresponding diminution in barometrical pressure. As the hot air rises, the process of aspiration draws the cold air from the north down to take its place. This process is repeated over and over again until summer temperature

is established and the lake water is more or less uniform in temperature with the air.

In the fall, as the water parts with its heat more slowly than the land, the lake has a modifying effect on the temperature of the air for a considerable distance from the lakes, but farther inland the effect is not felt, as the heated air on the water rises, and by the process of aspiration draws the land air toward the lakes.

In winter the lakes have little or no effect upon the temperature or humidity, for when frozen or filled with ice their influence can scarcely be distinguished from that of the frozen land. Thus it will be readily seen that a lowering of the temperature of this region increases the relative humidity of the atmosphere, and a corresponding dampness results.

One of the characteristics of the climate of the lake region is the amount of cloudiness, which is greater during the cool portion of the year. The average cloudiness of this section for the past twenty-five years has been 6·1 days out of ten.

The amount of cloudiness and rainfall depends upon the temperature and humidity, although the absence of clouds and rain does not go hand in hand with a low degree of moisture in the air, for a region may have a very moist atmosphere and yet be rainless or comparatively cloudless, if it is free from cold currents of air which condense its moisture. The atmosphere of Lima on the coast of Peru is generally very moist, but it hardly ever rains there, whereas in the region of the Gulf of Genoa the air and soil are quite dry, although there is a great deal of rainfall.

The cloudiness, rainfall, and humidity of this region by no means correspond with each other. The cloudiness (6·1) and humidity (0·74) are excessive, whereas the rainfall is much below other localities where the cloudiness is very much less. The average rainfall of this region is 27·8 inches, whereas New Orleans has a rainfall of 85·1 inches with a humidity of 0·79 and a cloudiness of 4·4 days only out of ten. New York has a rainfall of fifty three inches, a humidity of 0·73, and a cloudiness of 5·2 days only out of ten. Boston has a rainfall of 45·9 inches, a humidity of 0·70, and a cloudiness of 5·2 days out of ten. At each of these places the rainfall is much greater, while the mean relative humidity of the air is less than that of this region. Again, we see that Los Angeles, which has a relative humidity of 0·78 (exceeding this section in humidity, which is but 0·74), has a rainfall of 21·1 only, and a cloudiness of 2·8 days

only out of ten. This is owing to the absence of cold air currents to condense its moisture.

The difference between the actual and relative humidity is often very great, and depends to a great degree on the temperature. The dew point, as we know, represents the degree of saturation, and air is termed "damp" only when it is at or near the dew point. Warm air will suspend very much more vapor than cold air, and therefore air containing the same amount of vapor in suspension will very much sooner reach the dew point in a cool than in a warm atmosphere.

The distinctions between humidity and dampness of the atmosphere should be more fully recognized. Many places, such as islands located at sea, and many portions of our coast, have a very humid atmosphere, but at the same time are salubrious because the soil is porous and well drained and the uniformly warm temperature prevents the air from becoming damp. Damp air has a most detrimental effect upon the body by checking the insensible perspiration of the skin and the elimination of watery vapor from the respiratory mucous membrane. When this is suddenly checked, we experience the sensation of a cold, and this is the common source of all the catarrhal conditions of the bronchial tract.

Mucous tissue subjected to a damp atmosphere becomes more or less turgescent, and this becomes more pronounced if the tissue is diseased. This is due to two causes—namely, (1) to the endosmosis of the watery vapor of the air that takes place because it is much less dense than the blood, and (2) to the checking of the elimination of watery vapor from the mucous membrane. This turgescence of the tissue causes an increased supply of blood to the part, and supernutrition and hypertrophy of the tissues take place. As the mucous membrane of the nasal passages is much more exposed to atmospheric conditions than the deeper structures of the respiratory tract and is provided with a greater blood supply, it is subject to frequent turgescence, and is accordingly much oftener the seat of diseased conditions resulting therefrom. It is for this reason that catarrhal affections of the nasal passages are so much more prevalent in the region of the Great Lakes, where the air is excessively damp, than elsewhere.

This effect of damp air is illustrated by the pernicious habit of sleeping with windows wide open, allowing the free entrance to the bedchambers of the cold, damp air of the night, surcharged with moisture, which becomes especially detrimental when the tempera-

ture of the air is below 65° F. This custom is more prevalent among the people of this country than those of any other, on account of their belief that a superabundance of fresh air is necessary to healthful sleep. In Europe, on the contrary, people are generally careful to prevent the damp night air from entering their sleeping apartments.

Many people sleep at night in an atmosphere that they could not tolerate or live in during the day, and more colds are contracted and more persons are subjected to injurious exposures during sleep, while their bodies are in a state of the least resistance, than from any other cause. How common it is in the morning to hear people on rising complain of being "choked up" and of having a cold which they think they must have taken the day before in some unaccountable manner, being at the same time entirely unconscious that the damp night air that they had been so freely inhaling while asleep was solely responsible for their condition!

The relation of damp air to consumption is well recognized. This relation was first pointed out by Professor Henry I. Bowditch, in an address on Soil Moisture a Cause of Consumption, delivered before the Massachusetts Medical Society in 1862. He ably and clearly showed that the prevalence of consumption in New England was not uniform, but was associated with districts, localities, and even with houses which were damp. His views on this question were so conclusive that students of sanitary science, both at home and abroad, and also boards of health, were much influenced by his investigation and deductions.

Since that time Dr. Bowditch's deductions have been corroborated by every writer on this subject and are also confirmed by our daily observations. Persons whose occupation necessitates their remaining for a great portion of the time in a cold, damp atmosphere, or those who are much exposed to the cold, damp air of the night, are more than others subject to phthisis. At the time Dr. Bowditch made his investigations the existence of the bacillus of tuberculosis was not known; but, notwithstanding the conspicuous part that the bacillus plays in the ætiology of phthisis, the fact remains that but few cases of phthisis can be traced to inoculation by the bacillus when the bronchial mucous membrane had not been rendered a fertile field for its growth by the disorders engendered by exposure to a *damp* atmosphere. This is clearly emphasized by the comparative rarity of phthisis in a *dry* atmosphere.

The relation of damp air to diseases of the nose, throat, and lungs

is a subject of the utmost importance, as shown by the constant relation which they sustain to each other. In some instances, as in the case of this region, the influence of the cold-air currents from the lakes and the dampness caused thereby is, in a measure, uncontrollable. But in a great many instances, by thorough drainage of the soil and proper construction and ventilation of our houses, the prevalence of these diseases can be greatly lessened.

And now, gentlemen, before taking my seat I can not refrain from expressing to you again my heartfelt appreciation of the honor of being chosen to preside over this distinguished body. Trusting that in the discharge of my duties I may have your most cordial support, I now declare the seventeenth annual congress of this society open and ready for business in accordance with the programme before you.

Paper.

FOREIGN BODIES IN THE ŒSOPHAGUS: SPECIALLY CONSIDERED FROM THE POINTS OF VIEW OF SYMPTOMATOLOGY AND MORBID ANATOMY.

By HARRISON ALLEN, M. D.

AN inquiry, now completed, into the symptoms of foreign bodies in the œsophagus had its origin in a desire on my part to know something of these accidents from original sources. While highly appreciating the value of the monographs which have appeared on the subject, I allude particularly to the writings of Hévin (*Mém. de l'Acad. roy. de chir.*, 1761, vol. i, 444), Adelmann (*Prager Viertel-jahrsbuch f. prakt. Heilkunde*, xcvi, 66), Poulet (*A Treatise on Foreign Bodies in Surgical Practice*, English translation, Wood & Co., 1880), and König (*Deutsche Chirurgie*, Lieferung 35, 1880), and being grateful, as all clinicians must be, for the admirable *résumés* of Morell Mackenzie (*Diseases of the Throat*, vol. ii, p. 190, American edition) and John O. Roe (*System of the Diseases of the Ear, Nose, and Throat*, vol. ii, p. 500; edited by C. H. Burnett). I found that the analysis of available cases yielded conclusions which surprised me, and I hope that these may be found worthy of the attention of others. Let me here thankfully acknowledge the aid the *Index-Catalogue of the Library of the Surgeon General's Office* has given me. This splendid work now enables the student to apply a literary method to the description of diseases and effects of injuries. I am

aware that this manner of conducting medical research is not highly thought of, yet it happens to be a useful one, and in this instance at least the only one that will serve. The results of humble labors may be as acceptable as those in which brilliant powers are engaged.

The entire number of cases analyzed is eighty-two.*

A foreign body descending the entire length of the œsophagus (all bodies tending so to do) may develop symptoms owing to pressure or to direct lesion in one of the four regions to be named, or the body in passing may excite trouble in all. In illustration of this statement the following case is herewith abridged: A man, aged twenty-seven, swallowed a piece of glass while drinking beer; there immediately ensued sharp pain in the region of the larynx with slight hæmorrhage; an hour after this a cough was developed and great difficulty in swallowing solid food. Liquid food was taken, but subsequently vomited. On the second day suffocative feelings were noted. Occasional attacks of vomiting and pain in the region of the neck continued for three months; in the fifth month a swelling occurred on the right side of the chest over the clavicle. A short time afterward epigastric pains were complained of which prevented the patient from walking upright. In the ninth month an abscess formed in the skin of the abdomen and epigastric region which, being opened, was found to contain the offending body. The patient recovered (L. Henry).

Clinicians make no distinction between foreign bodies lodged in the laryngopharynx and those in the upper part of the œsophagus. While on anatomical grounds such a course can be criticised, it remains true that a foreign body lodged in the tract named is, in its main features, as though it were lodged in the upper part of the œsophagus itself. In the first place, the foreign body is out of sight, and at least by one symptom—namely, the enormous amount of mucous outflow—is quite like that of the body lodged back of the larynx or in the beginning of the œsophagus. The symptoms, such as cough, dyspnœa, etc., are precisely those of a body lodged farther down. We can say that a clinical region exists embracing the lower pharynx (laryngopharynx) and the œsophagus behind the larynx.

* The entire number of titles in the surgeon general's catalogue is three hundred and forty-six. Many of these were rejected as unsuited. Some were in languages I could not read, others were recorded in books which were unattainable in Philadelphia. The cases will always be referred to by the name of the author, since the title and reference can be easily found in the catalogue.

It is evident, for example, that dyspnœa (choking and strangling) is a symptom due to pressure of the foreign body forward, and either narrowing or obliterating the lumen of the trachea or, by exciting muscular spasm, even of the larynx. Dyspnœa is less noticeable when the foreign body has passed from the neck and has entered the thorax. While the danger of pressure against the vessels arising from the descending aorta and from the left side of the arch of the aorta is increased, the foreign body may even slip to the right side and enter the right pleural sac. The region where the gullet is crossed by the left bronchus is a fertile locality for bodies to be lodged,* and secure entrance into the trachea by ulceration due to inflammation and pressure. Finally, when the body lies between the left bronchus and the cardiac end of the œsophagus, entire absence of pressure effects is noted, but in their place ulceration of the œsophageal wall and resulting hæmorrhage from the œsophageal arteries or the descending aorta occur. From these considerations it is tenable that the interpretation of symptoms depends in great measure upon a correct understanding of the anatomy of the regions through which the œsophagus passes. Four of these regions may be recognized—namely:

1. The lower part of the pharynx and region back of the larynx.
2. The portion in the neck between the larynx and the sternal notch.
3. The portion in the chest between the sternal notch and the point of crossing of the trachea by the left bronchus.
4. The portion between the left bronchus and the cardiac end.

In a dissection made with reference to determining the relations of the œsophagus, I make the following note: The left common carotid artery lies on the left side of the trachea two inches above the bifurcation; the aorta, crossing in front of the trachea and descending on the left side, is peculiarly disposed to hold a foreign body. Both the common carotid artery and the aorta tend to support the left side of the œsophagus, while on the right side there is no such support, the œsophagus projecting slightly to the right of the trachea and lying directly against the pleura.

The study of the literature of foreign bodies in the œsophagus is, alas! a phase of necrology. Let us hope that the experience of practitioners is more favorable than would appear from the series

* I called attention to this fact in a paper entitled Localization of Diseased Action in the Œsophagus (*Philadelphia Medical Times*, 1877–'78, viii).

just completed. It must be remembered that many cases have been reported because of a fatal issue or from the necessity occurring for the performance of œsophagotomy.

The following divisions of the subject will be employed:

1. Spasmodic constriction of the œsophagus, regurgitation of food, and softening of the œsophageal walls.
2. Emphysema.
3. Interference with respiration, cough, etc.
4. Excessive mucous secretion.
5. Nausea and vomiting.
6. Hæmorrhage.
7. Anxiety.
8. Abscess.
9. Emission of air from the œsophagus.
10. Pain.
11. Convulsions.
12. Syncope.
13. Miscellaneous.

1. *Spasmodic Constriction.*—Not only are the circular muscle fibres of the œsophagus disposed to contract over the obstructing body, but a similar disposition is often recognized in the fibres for a short distance both above and below it. This liability exists to a more marked degree in the position last named, and the likelihood of its occurrence must always be remembered. Even if the shape of the body is favorable to recovery, the presence of a distal constriction makes it difficult for spontaneous descent and dangerous for the physician to make downward pressure with the probang. Indeed, the introduction of any instrument may excite spasm in the circular fibres (Blair).

The constriction of the œsophagus is doubtless the cause of regurgitation of food. In young subjects especially, the violent regurgitation following impaction of the œsophagus is characteristic. This fact is not mentioned by any of the monographers. In a case of McLean's, of a child of sixteen months, violent regurgitation of food (not vomiting) was the first symptom that attracted the attention of the nurse. A penny had completely obstructed the passage. The coin was removed and the patient recovered. The same observer remarked regurgitation in a woman, aged thirty-six years, who swallowed a rubber plate with artificial teeth.

If the observer notes the short time that has often elapsed between the date of the accident and the formation of an abscess or

ulceration, it is evident that softening of the walls of the œsophagus can occur with alarming rapidity.*

The œsophagus offers feeble resistance to the effects of traumatic inflammation. This is due to a fundamental fact that the canal is one for quick transit. The single provision made for the retention of the foreign body is that of constriction of the circular fibres; but this occurrence in the end increases the rapidity with which inflammatory softening occurs. Fabrice narrates the case of a laborer, aged twenty-six, who swallowed a piece of bone. He died on the fifth day. The bone was found at the autopsy lodged "at the end of the first half of the œsophagus." A perforating ulcer was noted in the posterior wall, the aorta was perforated at the arch, and the pericardium was inflamed.

2. *Emphysema.*—Emphysema was found in twelve examples out of the entire number, thus constituting fifteen per cent.; yet Mackenzie does not allude to it among the symptoms. Poulet states that emphysema as a primary symptom is rare, and knows of but one example. Busch claims that emphysema is due to vomiting, and is in all instances associated with perforation of the œsophagus. According to Broca and Weinlechner, emphysema is apt to occur at the junction of the œsophagus and pharynx. Crequi, Broca, Demarquay, and Osler describe it as occurring in examples where the foreign body was lodged at the junction of the œsophagus and pharynx, or just behind the cricoid cartilage. Gussenbauer found it in an instance where the foreign body was lodged behind the hyoid bone. The existence of emphysema is of varying significance. It is often found in cases which end fatally, while it is never the exciting cause of death. The symptom, therefore, does not imply that the patient is in a grave condition. Thus, Demarquay cites a case of a young woman who swallowed a fish bone; emphysema came on within two hours after the removal of the bone, yet the patient recovered. Morgan gives the facts in a case of a woman of forty-five years of age, in whom on the second day after swallowing a piece of rib, which constricted the œsophagus, emphysema occurred throughout the neck and the upper part of the chest; the foreign body was pushed into the stomach, the emphysema disappeared, and the pa-

* Blondeau (*Thèses de l'École de méd.*, 1830, ii) narrates the case of a man who, in order to escape detection for theft, swallowed some coins wrapped in a piece of linen. The chances for the coins to pass were greatly diminished by the circumstance that they were thus covered with linen cloth. The walls of the œsophagus underwent inflammatory softening, with the resultant death of the patient.

tient recovered. It must be acknowledged, however, that in most instances in which emphysema is noticed a mortal result ensues. In Broca's case, a male idiot, aged twenty-seven, who swallowed a piece of rib with flesh attached, emphysema ensued immediately, and the patient died in twenty-four hours. Crace notes the case of a child, five years of age, who swallowed a coin; emphysema occurred forty-eight hours afterward, the child dying on the fifth day. The coin had done much mischief: it had entered the sheath of the vessels on the left side and dissected from each other the carotid artery and pneumogastric nerve. In Demarquay's case excessive pus infiltration was present in the neck, extending from the skull to the fifth dorsal vertebra and passing thence into the right pleural cavity. It may be said that the presence of emphysema in any group of foreign bodies other than those behind the larynx is rare. Richet found emphysema occurring on the second day in a man who swallowed a set of artificial teeth. The patient died on the fourth day. The plate was found lodged behind the first joint of the sternum. Since the occurrence of emphysema was not immediate, and the body is not described as having rested behind the larynx, it is fair to assume that the entrance of air in the tissues occurred at the point at which the plate was found after death. In another case a man swallowing a bone died on the second day; the bone was found in the posterior mediastinum. Related to the subject of emphysema, and yet not properly belonging to the account of foreign bodies, is a case of McLean's of a man, thirty years of age, upon whom œsophagotomy was performed. Emphysema occurred in the lips of the wound, the patient dying in forty-eight hours (Thomson)

On the whole, it will be seen that the symptom of emphysema is one of more than passing interest. It usually occurs when foreign bodies are lodged back of the hyoid bone; yet it is not impossible for the lesion exciting emphysema to be located at other parts of the œsophagus. It is in every way probable that the point at which air for the most part enters the tissues is that which is the weakest part of the canal—namely, at the place where the circular set of muscular fibres unites with those of the pharynx.

3. *Interference with Respiration, Cough, etc.*—The symptoms referable to the respiratory organs are intricate and important. A large body lodged behind the larynx and upper part of the trachea will induce immediate dyspnœa or even apnœa. The occurrence of such symptoms is conclusive either that the foreign body is large enough to force the anterior wall of the trachea forward, thus mak

ing absolute occlusion, or, as when the body lies back of the pharynx, to make such forward pressure as to excite laryngeal spasm. Blair relates an instance in which spasm ensued each time a probang was passed. Doubtless in this case the probang itself added to the distention to a degree sufficient to cause the condition named. As a rule, cough is induced by forward pressure of the foreign body so as to excite the mucous lining of the trachea and cause it to pour out an excess of mucus. Bousquet reports this symptom as occurring three weeks after a piece of bone was lodged in the cardiac end of the œsophagus; the case proved fatal a week afterward, by ulceration of the descending aorta.

R. Brown reports a case of a woman, sixty-two years of age who, after swallowing a piece of bone, had chronic cough for eight months, which ended in the violent evulsion of the offending body. Cauchois found in a woman, twenty-seven years of age, in whom a piece of bone was lodged behind the cricoid cartilage and four upper rings of the trachea, asthmatic cough, hoarseness, and attacks of dyspnœa for five months; the case resulted fatally. The body was found after death lodged in the anterior wall of the œsophagus. Mees reports a case of a child who swallowed a steel screw; death ensued on the third day; cough was a conspicuous symptom. Occasional suffocative attacks with dyspnœa also occurred. The screw was found after death on the level of the first joint of the sternum; it must have exerted great pressure forward against the trachea. May reports the case of a boy, seven years of age, who after swallowing a half-penny suffered from cough for three years associated with attacks of dyspnœa; the coin was afterward ejected and the patient recovered.

Pressure against the larynx exciting secondary cough after the subsidence of the primary symptoms is not to be confounded with cough as a primary result of excitation of the larynx, as when a fish bone is lodged behind the cricoid cartilage or directly exciting the arytænoid region (Cheever). A strident cough may be a permanent symptom and, unlike aphonia, be succeeded by morbific conditions.

Aphonia appears to be confined to females, and has no connection either with the position or the nature of the foreign body. It is doubtless reflex in origin. A piece of flesh and bone lodged back of the larynx in a woman, aged eighteen years, excited this condition primarily (Crache). In a woman, aged fifty-four years, a piece of pork lodged in the upper part of the œsophagus caused aphonia.

Verneuil found that aphonia may be produced by a needle which was lodged in the tissues of the neck.

Hoarseness is often a primary symptom. It is usually associated with cough and does not require a separate analysis (Cheever). An interesting case is cited of a boy, four years of age, who swallowed a half-penny. A harsh cough remained after the subsidence of the primary symptoms. The child died in the eighth month after the accident. The penny was found in the œsophagus just above the bifurcation of the trachea. Changes in the character of voice other than hoarseness and the weakness of voice from debility are noteworthy. The voice is distinctive, being described as harsh, metallic, or chirping, but unlike that of the individual in health. Stridor is less frequent than one would be led to expect. It occurred to Van der Warker in a man, aged thirty-six years, who swallowed a piece of cartilage. Laryngeal spasm is noted by Torrance in a man who swallowed a bone of a rabbit. Kurz reports a case of a girl, aged twenty years, who swallowed a needle; paresis of the vocal cords ensued, which persisted for some time after the needle had been removed; an abscess formed in the neck.

4. *Excessive Mucous Secretion.*—Occasionally a person who has a foreign body lodged in the œsophagus will exhibit excessive quantities of mucus or saliva in the mouth and in the lower part of the pharynx. This important symptom is not even mentioned by general writers. It invariably signifies that in the neighborhood of the glands of the pharynx and mouth a foreign substance is exciting the mucous and salivary glands. It can not be distinguished from the presence of mucus in a case of post-œsophageal abscess, or indeed from the mucous excess of carcinoma of the œsophagus. If the pus be a little farther down—namely, back of the larynx—we are apt to have the same symptom present. A piece of bone lodged just below the pharynx is known to excite post-œsophageal abscess, the patient dying on the ninth day; throughout the history of the case an excessive amount of mucus was constantly brought out of the pharynx (Ribes). In persons of imperfect intelligence the presence of excessive mucus is of special value in determining the location of the body. In an idiot, aged twenty-five years, who swallowed a triangular piece of bone, lodging in the right side of the pharynx just as it joins the œsophagus, enormous amounts of mucus poured out of the mouth during the entire period, from the date of the accident to that of the death on the fifth day (Brown). A man, aged twenty-eight years, swallowed an artificial plate with four teeth.

The primary symptoms were dyspnœa, dysphagia, frequent retching, and blood-stained saliva. The secondary symptoms were cough and the formation of copious masses of pharyngeal mucus which were occasionally slightly tinged with blood. These symptoms persisted for fifteen months, when they disappeared and the patient recovered by the removal of the foreign body with his fingers. This case is of importance since it locates the body high up in the œsophagus or in the pharynx. It excludes post-pharyngeal abscess as a cause of excessive formations (Bridgman, H. G.). A soldier swallowed a fragment of bone, and the primary symptom was pain on the level of the top of the sternum. As a secondary symptom, abundant salivation occurred. The body was pushed down into the stomach and the symptom disappeared (Bouregois, A.).

In a boy, aged twelve years, a penny was lodged in the upper part of the œsophagus, whence it was extracted on the sixth day. In addition to the hoarseness in this case, salivation was a prominent symptom. Excessive formation of mucus appears to be as valuable a sign in old age as at any other time of life. A woman, aged sixty years, swallowing a set of artificial teeth, had as a principal symptom the excess of secretion, which symptom disappeared after the extraction of the teeth from the upper part of the œsophagus on the second day (Savory, Swinburne).

French writers draw no distinction between this excessive secretion from the throat and expectorated matter. Owing to this circumstance it is not possible always to distinguish in their reports between the sign alluded to and the results of tracheitis or pneumonia. In one case the mucus was undoubtedly of pharyngeal origin, since it disappeared after the removal of the foreign body (a shawl pin) by the finger from the beginning of the œsophagus. The subject was a child six months old (Paulin). That the symptom is due to excitement is proved by the case of a man who, after swallowing a piece of bone, suffered from œsophageal obstruction; the amount of mucus was excessive. The patient recovered after the downward passage of the bone, the excess of mucus having lasted five weeks.

An interesting instance of the importance of recognizing the secretion is seen in the case of an old woman, aged seventy years, who swallowed a set of false teeth. It was lodged in the laryngopharynx and was removed, but the excitement of the glands continued, and in the judgment of the reporter the patient would have perished had not great care been taken to remove for some time

afterward the mucus as often as it formed. The secretion in this instance appears to have been exceptionally tenacious, and its retention after the extraction of the foreign body was probably due to the lack of normal tonicity in the muscles of the pharynx (Dawson).

I have met with no cases in which excessive mucus formation is reported in young children. While recognizing that negations are not of much value, this fact is worthy of mention, since in post-pharyngeal abscess of children copious mucoid expectoration is naturally present. It is probable that a diagnosis between a foreign body in the œsophagus and the presence of pus back of the pharynx in childhood may be made by the fact that in the former we have mucus excessive and in the latter not.

On the whole, it may be stated that the expectoration of large quantities of mucus in the adult, associated with the history of swallowing a foreign body, invites careful search for this body either in the pharynx, larynx, or the œsophagus behind the larynx.

If salivation can be excluded, the presence of ropy mucus in large quantities in the pharynx and its being rejected by the patient with some difficulty is, in my judgment, pathognomonic of disease in the pharyngo-larynx, or in the œsophagus, at or above the level of the left bronchus. The mucus may arise from the presence of a foreign body in either of these regions; it may be excited by pus in the retro-pharyngeal and the retro-œsophageal spaces; it may be due to carcinoma (first stage) involving the pharyngo-larynx and the upper part of the œsophagus. Diagnosis of malignant disease of the œsophagus (early stage) can be made at a time coincident with the beginning of dysphagia and long before emaciation or dyscrasia is announced.

Care must be taken to distinguish œsophageal disease from aneurysm of the aortic arch, the backward pressure from which may excite dysphagia and by the pressure on the left bronchus induce bronchorrhœa. I am desirous of making this comment since, in a case which I saw lately in consultation with Dr. J. M. Anders, a diagnosis was to be made between carcinoma of the œsophagus and bronchorrhœa of the type just named. Dr. John H. Musser, in his *Medical Diagnosis* (page 423), states that an aneurysm of the aortic arch may excite dysphagia and by pressure on the bronchial tubes may induce bronchorrhœa from dilatation. Was the cough and mucous outpour due to an aneurysm causing bronchorrhœa by pressure, or was it due to direct excitation of the œsophageal glands by disease in the walls of the œsophagus? The case proved to be one

of carcinoma of the œsophagus; but the point of differentiation in the condition just named must always be made with great care.

5. *Nausea and Vomiting.*—Nausea and vomiting are among the most common symptoms of foreign body in the œsophagus (Blondeau, *Thèses de l'École de méd.*, 1830, 2). This is not surprising when one reflects with what ease vomiting is excited by the use of an instrument in the lower part of the pharynx or upper part of the œsophagus. Yet vomiting may be a symptom when the body is lodged near the cardiac end. Dudley, Denton, and Morgan report cases of this character. It is reasonable to suppose that the upper and lower parts of the œsophagus may be, when irritated, more likely to excite vomiting than the intermediate portion of the œsophagus. Vomiting is not always a primary symptom. In the cases just cited it occurred from the third to the ninth days. It would appear that vomiting as a secondary symptom is of more serious import than when it is primary, if we can conclude anything of value from so small a number of cases. In Dudley's case vomiting occurred on the second day and death on the third from hæmorrhage; in Morgan's case vomiting occurred shortly before hæmorrhage due to ulceration into the aorta; in like manner, in Duncan's case vomiting occurred on the ninth day, immediately preceding a fatal hæmorrhage.

6. *Hæmorrhage.*—The occurrence of hæmorrhage in a case of foreign body in the œsophagus is of importance, and, as a rule, it signifies that the body has caused ulceration of the wall of an important vessel, or has directly wounded it. Usually it may be said that a primary hæmorrhage is of little significance, while a secondary hæmorrhage is always of grave import, and a fatal termination of the case can be foreseen as a rule. Hæmorrhage by ulceration is, of course, a secondary symptom, but the rate at which it appears is exceedingly variable, and is determined by the resistance of the tissues as well as by the nature of the body. Fragments of bone are more apt to excite the complication than any other substance (*vide supra*, Fabrice). In four weeks after the swallowing of a piece of bone a hæmorrhage has occurred from the descending aorta (Busk). A similar instance occurred thirteen years after a coin had been swallowed. During all this time it had been lodged at the level of the bifurcation of the trachea; the patient died of hæmorrhage into the stomach (Dorsey).

Contrasted with this case in a striking manner is that of a young woman, aged twenty-two years, who swallowed a set of artificial teeth and died on the ninth day as a result of ulceration of the aorta

(Duncan). Huhues reports a similar case, that of a young woman who swallowed a bone; hæmorrhage occurred on the ninth day and the patient died on the tenth.

A fourth case is that of a man, aged twenty-five years, who, after swallowing a piece of bone, died on the eighth day of hæmorrhage; in this instance the left carotid artery was penetrated. The fifth example is that of an old woman who died on the tenth day; the blood in this case passed into the stomach. Another case was that of a man who died on the fourteenth day from hæmorrhage consequent upon ulceration into the aorta. A remarkable instance is reported of an aged woman who died from the effects of ulceration in the right subclavian artery, which passed in front of the œsophagus (Kirby). A woman, aged sixty-five years, died from hæmorrhage on the tenth day; blood had passed downward. The bleeding in this case was from the right thyreoid artery (Pilati). In a girl, aged eighteen years, who swallowed a piece of bone, fatal hæmorrhage ensued at the eighteenth month. The blood passed downward. The aorta was perforated. In a man, aged twenty-nine years, who swallowed a spiculated piece of bone, death ensued from hæmorrhage on the ninth day. The aorta had been directly wounded.

The entire percentage in which hæmorrhage occurs is very large —namely, twenty per cent. Of the entire number, in fifteen per cent. one of the great vessels was opened; in all of these instances excepting two (the carotid and right subclavian) the aorta was the vessel which suffered. Among the smaller vessels, the inferior thyreoid artery and the œsophageal arteries are mentioned. Those in which the source of hæmorrhage is not named are presumably capillaries in the walls of the œsophagus.

As already noted, as the blood escapes in the œsophagus at a point low down, it often trickles into the stomach, where it is found by examination in cases of sudden death; or it may pass by the rectum in more lingering forms. Thus bloody stools may exist with or without hæmatemesis. The direction of the flow of blood being upward if the vessels of the neck are involved, it naturally escapes by the mouth. It is scarcely necessary to add that the hæmorrhage from the mouth is not inconsistent with the occurrence of bloody stools in the same individual (Morgan). In the case of a man dying on the eighth day, it was found that the œsophageal arteries near the cardiac end had been lacerated (Labat). In a middle-aged man blood escaped only into the stomach, and no location of the source of the bleeding could be detected after careful dissection of the

œsophagus (Dudley). When a patient reports with hæmorrhage from the rectum and no history of a foreign body of the œsophagus is elicited, it becomes a matter of moment to locate the source of the bleeding. The case of Labat may be so cited, as well as a second —namely, that of a girl of sixteen years who swallowed a needle. Bloody stools ensued, the patient dying on the eleventh day.

The immediate wounding of an important vessel is, of course, possible. A needle may penetrate the aorta at once with a fatal result (Mackenzie). A young man swallowed a shell-like fragment of bone, which divided the common carotid artery as though it had been cut by a knife (Richet).

Hæmoptysis is rare in the history of an œsophageal foreign body. A case is cited, however, of a woman, aged sixty-nine years, who swallowed a piece of bone and who raised blood in the act of coughing for eight months after the accident. The patient recovered after spontaneous ejection of the offending body (Brown).

Hæmorrhage from direct laceration of the œsophagus is less commonly seen than would at first sight be supposed. The following statement illustrates the possibility of such a lesion: A woman, aged thirty-four years, swallowed a pocket knife. Hæmorrhage ensued from the wound made by the knife (Gussenbauer). A fish bone lodged in the œsophagus behind the cricoid cartilage has been known to be followed by bleeding (Mixer). Capillary hæmorrhage can be excited by the surgeon in his efforts to remove the foreign body (Torrance).

7. *Anxiety.*—Anxiety is prominent among the symptoms, and apparently is in no way associated with the character of the substance which has been swallowed. The patient who knows that a foreign body is lodged in the œsophagus has, according to the reports of acute observers, an anxious expression, which is not seen in those who imagine that they have swallowed an obstructing mass of some sort. Aschenborn reports anxiety being present on the second day in a girl of sixteen who had swallowed a needle, the patient dying on the eleventh day from hæmorrhage; Paulin reports the symptom in a woman who had swallowed a shawl pin; Torrance detected it in a man who had swallowed a bone of a rabbit; and McLean also remarked the symptom in a woman who had swallowed a set of artificial teeth. Verneuil places importance upon anxiety. It is probably much more frequently present than is reported. Doubtless other phenomena occasionally observed, such as insomnia (Buist), belong to this category.

8. *Abscess.*—A foreign body in the cervical portion of the œsophagus rarely involves the peri-œsophageal structures. The sheath of the great vessels is recorded as involved in two instances only (Crequi, Richet). In the chest the offending body can make pressure forward, but the conditions are such as to greatly diminish the risks of side pressure.

The descending aorta, the left carotid, and the left subclavian arteries cause the descending body to be deflected to the right. Hence involvement of the left pleural sac is among the rarest of lesions, while four examples (Busch, Demarquay, Ribes, Shann) are recorded in which air and pus were found in the right pleural sac from rupture of the œsophagus.

In an article in the *Edinburgh Medical and Surgical Journal*, vol. lxxi, 1849, p. 130, twenty cases of diseases of the œsophagus are mentioned in which post-mortem results are described. Of this number, eleven exhibited perforating ulcers of the œsophagus involving the right pleural sac or the right lung; two exhibited perforating ulcers involving the right bronchus, while in two only was there any involvement of the left pleura or left lung. The material for the most part is from the analyses of Vigla (Recherches sur les communications accidentelles de l'œsophage avec les poumons et les bronches. Par le Dr. Vigla, médecin du bureau central des hôpitaux. *Archives générales*, 4me série, i, 12, octobre, 1846).

Pus often forms quickly in the posterior mediastinum when a foreign body is lodged in the œsophagus. Five cases are noted in which pus was found at some point about the œsophagus. The import of the presence of pus is very slight: one of the cases proved fatal on the fifth day (Demarquay), one on the eleventh (Aschenborn), and one not until nearly two years had elapsed. But it is, of course, open to surmise in the instance last given as to the length of time pus had been present. Abscess and emphysema were present together in one case (Crequi). Inflammatory swelling, which did not go on to suppuration, occurred in one case (Kurz). The foreign body was a needle. The patient recovered. The pus in a few minutes has been known to enter the sheath of the great vessels of the neck (Crequi, Ribes, Richet).

A nice point of diagnosis arises when a cervical swelling occurs and the presence of a foreign body is suspected. The body may pass into the stomach, yet its retention in the œsophagus may have been of a kind sufficient to excite a peri-œsophageal inflammation and abscess. A case of this kind in a woman, aged sixty, led to an in-

cision being made to empty the collection. But no opening existed in the œsophagus, nor was a foreign body found. The case may have been idiopathic (Thomas).

9. *Emission of Air from the Œsophagus.*—Belching is a symptom which is very rarely present, and, indeed, is not mentioned by general writers. Its significance is grave, as can be seen in the following case: A young man swallowed a set of artificial teeth. The body was apparently lodged at first in the neck, since dyspnœa, stridor, and an attack of syncope are mentioned among the primary symptoms. On the tenth day the patient was seized with cough, dorsal pains, and attacks of choking. Incident to one of the attacks last named, he belched large quantities of air. The features last named persisted, the patient dying of phthisis* fifteen years after the original accident. At the autopsy an opening was found in the œsophagus two inches below the larynx, which communicated with the trachea. No foreign body was found. The observer (Castle) believed that during deglutition air passed from the trachea into the œsophagus and was forced into the stomach. After a while belching relieved the stomach of the distention caused by the presence of air.

An equally remarkable case with the foregoing is that of a girl, aged five years, who swallowed a small tin saucer belonging to a toy set of dishes. The child was but little distressed for four months, when, in the second day of an attack of croup, regurgitation of food occurred and (following the introduction of an instrument) emission of air. Diagnosis was made of an obstructing œsophageal foreign body and œsophageal-tracheal fistula. The patient died of exhaustion in one month after the attack just described. At the autopsy the toy was found lying across the œsophagus, five inches from the upper end. A large fistula between the œsophagus and trachea was demonstrated. It is fair to assume here that the saucer had lain for four months on the anterior side of the œsophagus, and had made sufficient pressure on the trachea to form a fistula, which the plate itself occupied. During the attack of croup the plate shifted its position, fell farther down and turned over so as to obstruct in great part the œsophagus; the fistula was now unguarded, so that air escaped into the gullet (Pattison).

* The occurrence of phthisis and the simulation of phthisis in patients who are known to have swallowed foreign bodies is of importance. Roe lays special stress upon this subject.

Care should be taken to distinguish belching from retching. Retching is a part of the act of vomiting.

10. *Pain.*—The value of pain is not as great as at first sight would be supposed. Yet Poulet asserts that in diagnosis "pain in one spot" is one of the most reliable aids. If the foreign body impinge violently against the walls of the œsophagus, as occurred in a case of Roze, in a man who swallowed a five-franc piece, the pain at the point of impact may be severe. Great pain also ensues upon swallowing plates of artificial teeth. But most observers say little or nothing of pain. Its locality is far from constant. It was referred to the cervical and dorsal vertebræ in three cases; over the epigastrium in two; back of the sternum in three; and at the base of the neck in one. According to Blondeau (*Thèses de l'École de médecine*, 1830, ii), soft and slightly humid bodies are apt to cause more pain than those that are hard and solid. Verneuil asserts that the pain is usually referred to the upper part of the œsophagus, no matter at what point the body may be lodged.

11. *Convulsions.*—Since convulsions arise from many causes which disturb the economy, it is not surprising to learn that they are also occasionally associated with foreign bodies in the œsophagus. In adults it was observed in two females (Marston, Meyer) and one male (Castle). It is strange that Poulet states that convulsions "are encountered frequently." All the cases cited by him are from Hévin and are not modern.

12. *Syncope.*—Of the same general character with convulsions belongs the subject of syncope. Fright probablyaccounts for its occurrence. It is reported but once in a woman (Langenbeck).

13. *Miscellaneous.*—Every subject has its curiosities. A case of tetanus associated with œsophageal foreign body is reported by Larrey and one of enuresis by Maxwell. Nélaton is quoted in connection with a case of myelitis from a foreign body penetrating the spinal cord. Mackenzie refers to a case, not otherwise reported, of Turtle's, similar in character.

I have drawn the following conclusions from the premises stated above: Authors of monographs on foreign bodies in the œsophagus have overlooked the rapidity with which softening of the walls of the œsophagus occurs, the significance and value of emphysema, the occurrence of excessive mucous secretion, and the possibility of emission of air; and, in the second place, they have laid too much stress upon pain and convulsion, but not enough, at least in the adult, upon the presence of an anxious expression of countenance.

Paper.

THE TREATMENT OF GOÎTRE AND EXOPHTHALMIC GOÎTRE BY THYREOID EXTRACTS AND DESICCATED THYREOIDS.

By E. FLETCHER INGALS, M. D.,

WITH THE COLLABORATION OF

HENRY G. OHLS, M. D.

I FEEL it almost necessary to apologize to this association for bringing before it so old a subject, but as my own experience in the medicinal use of the thyreoid gland is comparatively recent, and as there are many things about the subject not yet settled, I think it possible that it may be of interest to some others of this association as well as to many practitioners.

In looking over the histories of my private patients for the last fifteen years I find eighty-one cases of bronchocele and exophthalmic goître that I have treated, sometimes with very indifferent success, but often with most gratifying results.

My usual plan of treatment has been to place the patient affected with goître upon the iodide of potassium, in doses of from five to ten grains in water after each meal. In the course of two or three weeks, if there has not been decided amelioration of the symptoms, this has been substituted by the tincture of iodine, given in doses of from five to twenty-five drops, which was placed in a capsule just before the patient took it, the dose being followed by a full glass of water, and given three or four times a day. Five drops were given at a dose the first day, six the second, and so on until the maximum dose was reached. If this did not speedily effect diminution in the size of the gland, I have also injected the enlarged thyreoid with a three- to five-per-cent. solution of carbolic acid in glycerin and water, using from twenty to thirty or even fifty minims of the solution at each injection, usually about thirty minims once a week.

Since the thyreoid extract was recommended by G. R. Murray in October, 1891, and the entire gland by F. Howitz in March, 1892, I have been much interested in the report of cases treated by this method, but on account of the inconvenience of obtaining the thyreoid juice and from fear that it might become contaminated before used, I have not employed it. It was only recently that my attention was directed to the desiccated thyreoids as prepared by Armour

& Co., which, from the reputation of this firm for doing whatever it does in the best possible manner, I concluded would be reliable. I procured some of the desiccated thyreoids about ten weeks ago and began their administration to two or three patients who were then under my care. I have since used the remedy all told in six cases of goître, the histories of which I will presently give.

The employment of these animal products seems to have had its origin in the experiments of Ewald and Schiff, who, in 1887, removed the thyreoid gland from dogs, and found that death occurred after a period of hypnotic apathy, followed by tetanic contractions of muscles.

Schiff found that by removing the two lobes at intervals of twenty-five to thirty-five days the animal might survive. Ewald also found that a thyreoid extract injected into a healthy dog hypodermically caused a similar but temporary condition of apathy.

The survival of some thyreoidectomized animals may have been due to accessory thyreoids, as pointed out by F. Fuhr. A close relation between the normal action of the nervous system and functional activity of the thyreoid was here apparent, but whether it was due to the presence in the blood of a substance secreted by the thyreoid or whether the glands metamorphosed something derived from other organs was not determined.

Horsley's experiments on monkeys indicated that the changes due to the removal of the thyreoid were caused by impaired nutrition. His further conclusion that the gland had a hæmatopoietic function is disputed by Virchow and Waldeyer.

As to the ætiology of goître, Lustig professes to have found a specific bacillus in water from the Aosta Valley, where cretinism and goître are endemic, but it seems very doubtful whether this theory can be substantiated.

As pointed out by the Reverdins, of Geneva, removal of the thyreoid in man is followed by myxœdema, and in children by arrest of development. Sanquirico and Oreccia note that herbivorous animals stand the removal of the thyreoid better than carnivora. Biondi, basing his opinion on histological study, maintains that the alveoli of the thyreoid secrete a colloid material which passes into the lymphatic channels. Albertoni and Tizzoni state that the blood-corpuscles acquire in the thyreoid the power of fixing oxygen.

Mobius contrasts Graves's disease with myxœdema, the former being due to excitation and the latter to arrest of the functions of the thyreoid. Ord says that myxœdema, sporadic and endemic cre-

tinism, cachexia strumipriva, and operative myxœdema of animals are all due to annihilation of the function of the thyreoid body.

The myxœdema committee, appointed by the Clinical Society of London in 1887, reported, after an exhaustive study of this disease, that one condition common to all consisted in destructive changes in the thyreoid.

William Robinson, in the *British Medical Journal*, vol. i, 1893, tabulates the following conditions associated with or resulting from deficiency of the thyreoid secretions:

1. Cretinism.
2. Congenital goître.
3. Atrophy of the thyreoid gland in childhood (semicretins).
4. Goîtrous degeneration symptoms in proportion to the amount of the thyreoid gland destroyed.
5. Extirpation of the thyreoid causes cachexia strumipriva.

The use of the thyreoid gland as a medicament was naturally suggested by the ascertained pathology of myxœdema, and the relation of myxœdema to goître doubtless suggested its use in the latter. Among the earlier experiments Eiselberg saved two animals from the development of myxœdema after removal of the thyreoid by grafting a thyreoid under the peritonæum. The first operation on man to an account of which I have had access was that reported by M. Lannelongue, of Paris, in the *Transactions of the Biological Society*, March 7, 1890. This consisted in the transplantation of two thirds of a sheep's thyreoid subcutaneously under the breast. In England, Victor Horsley, following the experiment of Eiselberg (*British Medical Journal*, February 8, 1891), suggested grafting the thyreoid gland.

The first successful transplantation of the gland in England was performed by J. W. Collins, May 2, 1892, at the Temperance Hospital, Hampstead Roads. He reported that in cases so treated menorrhagia, headache, and melancholia were relieved in twelve hours. His ultimate results are not recorded. The permanence of effect depends upon the vitalization of the gland. If the gland becomes absorbed, the effects are temporary.

G. R. Murray (*British Medical Journal*, October 2, 1891) suggested the hypodermic use of thyreoid juice made by mincing a gland from the sheep, covered with one cubic centimetre of equal parts of glycerin and a five per-cent. solution of carbolic acid, and straining or decanting the pinkish juice that rises on standing twenty-four hours. Of this juice enough should be used to supply the normal

secretion of the thyreoid gland, which he estimates at about one minim a day, but the exact dose was not determined.

F. Howitz, professor of clinical surgery at Copenhagen, claims priority in the internal use of the entire gland (March, 1892).

Dr. H. W. G. Mackenzie, in 1892, suggested the internal use of two fresh glands daily, minced with beef tea or with glycerin; later to be taken twice a week, then at longer intervals. No ill effects were recorded; but when a large amount was taken for several days the pulse was increased in frequency and the heart was apparently somewhat enfeebled.

The results of the treatment of myxœdema by thyreoids seem favorable when the glands are given internally, or hypodermically in the form of a carbolized glycerin extract, or in the form of desiccated thyreoids, the dose depending upon the concentration of the preparation.

The use of this substance in obesity was reported by H. W. G. Mackenzie in the *British Medical Journal*, July 21, 1894; but the results were doubtful. His patient lost eight pounds and a half during the first month, but subsequently gained five pounds within three months, although the remedy was still continued. He had no bad effects from the remedy, but thought it had little influence on the condition.

W. Towers-Smith, in the *British Medical Journal*, July 14, 1894, reports a case of obesity improved by the remedy, though it caused some illness and he considered it unsafe. Of Ewald's three cases, reported in *Berl. klin. Woch.*, January 14 and 21, 1895, the first patient exhibited no change, the second lost 3·5 kilogrammes, and the third lost 9·2 kilogrammes; this case had a superficial appearance of myxœdema, but not the characteristic symptoms.

I speak of the use of these remedies in myxœdema because this is the first disease in which they were considered of benefit, though I have had no experience with that affection. I speak of their use in obesity because reports show that they sometimes have a good deal of influence upon the weight; but I desire specially to call attention to the medicinal use of the thyreoid gland in the treatment of goître, and incidentally in the enlargement of the thyreoid existing in what is known as Graves's disease, or exophthalmic goître. Reported cases of goître treated by thyreoid glands seem somewhat rare in medical literature, though, no doubt, there have been some that I have not been able to discover in the journals to which I have had access in the Newberry Library, of Chicago.

As late as April 14, 1894, the editor of the *British Medical Journal*, vol. i, page 839, said, in answer to a query as to the effect of the thyreoid treatment, that "only amelioration has been noticed, as far as we are aware, and no actual cure in exophthalmic goître"; but Dr. P. Bruns, in *La Semaine médicale*, 1894, vol. xiv, page 968, reports the cure of nine cases of goître out of twelve treated. He used an extract of raw glands, in doses of one and a quarter to two and a half drachms, every two to eight days. Parenchymatous enlargement was reduced, but cysts were not affected.

W. B. O. Ferguson, in the *British Medical Journal*, vol. ii, 1894, reports a case of exophthalmic goître improved by the internal use of a quarter of a thyreoid gland twice a day. Treatment was begun on the 14th of December, 1893, and extended to July, 1894, but it had to be discontinued for a short time on account of diarrhœa and nausea.

A. G. Auld, of Glasgow, reports in the *British Medical Journal*, July 7, 1894, a case of exophthalmic goître of two years' standing, in which the thyreoid was much enlarged, with slight exophthalmia. This was treated by him and Dr. Charteris with Burroughs and Wellcome's thyreoid tabloids, given every three days. The dose was increased to two tabloids daily for nine days. The patient was nauseated and perspired freely. They thought the tabloids caused increase in the Graves's disease, due to an increase in the thyreoid secretion.

H. W. G. Mackenzie reports little effect in a case of exophthalmic goître associated with obesity. As to the toxic action of the thyreoids, Ewald noted a case of glycosuria during treatment, which ceased when the remedy was discontinued.

In *La France médicale*, January 25, 1895, we find the statement that "thyreoid juice poisons the heart and may cause death by syncope, one adult and two children having died in Paris hospitals from its exhibition. The juice has a cumulative effect, like digitalis, and great care is necessary to avoid excitement or exertion during treatment and for some time afterward. Sudden deaths in England took place several days after treatment was discontinued. The pulse may reach 110, or even 160, under exertion during treatment, and its rapidity and quality should be carefully watched."

In the *Revue des sciences médicales* of April 15, 1895, E. Gley notes as the result of administration of thyreoid extract in some cases loss of weight, in others signs of Basedow's disease.

Langendorff, in 1889, noted sudden death, with coma and con-

vulsions, following hypodermic or intravenous injections in animals of the thyreoid extract.

Alonzo's and Horsley's experiments are negative.

Fred Gourlay, *British Medical Journal*, vol. ii, 1892, expresses the opinion that the active principle of the thyreoid extract is a globulin which may be prepared by mincing and drying the gland at a low temperature. Ewald suggests peptic digestion and dialysis.

The preparations used in the various experiments just referred to were the thyreoid tabloids, five grains each, made by Burroughs, Wellcome & Co.; thyreoid extract, by Brady & Martin; thyreoidin powder, by Allen & Hanbury; thyreoid elixir, by the same; and thyreoid extract, made as already described.

Just as I was completing this paper an address on the thyreoid therapy, by Dr. S. J. Meltzer, before the German Medical Society of New York, March 4th, came to hand (*New York Medical Journal* of May 25th). He reviews at length the earlier literature of animal extracts, giving particular attention to the use of thyreoids in myxœdema. He concludes that in the absence of the normal secretion of the gland the patient will need continuous treatment by thyreoids, with occasional intermission, to supply the deficiency.

He considers a feeling of chilliness the earliest symptom of return of myxœdema requiring treatment, as this is noticed before weight increases. He states that the poisonous effects so often noted are due to overdoses, and that they can be absolutely avoided by giving at first only the equivalent of a grain of Parke, Davis, & Co.'s powder. The dose may be gradually increased, while carefully noting the pulse and temperature. In his cases the more serious symptoms were avoided, but he met some acceleration of pulse, fatigue, some tremor, headaches, and diffuse pains, and in some cases urticaria. Iron and strychnine relieved the weakness, salicylate of sodium and phenacetine the pains and aches. A sixteenth of a grain of pilocarpine, three times a day, relieved the urticaria.

For obesity he considers thyreoids the best remedy. By limiting the dose to three grains three times a day, he avoided unpleasant effects while reducing the patient's weight about a pound a week.

From the fact that dyspnœa and palpitation, when present, were promptly relieved, he infers that the first disappearance of fat occurs in the heart, and, further, concludes that small doses will prove to be effective in the treatment of *cor adiposum*.

I have used only the desiccated sheep's thyreoids already re-

ferred to, six grains of which represent one entire average gland, and in quite a large number of cases which I will summarize the same preparation has been employed. Armour & Co. kindly furnished me the addresses of a number of physicians who had applied to them for the remedy. I have written to these gentlemen, and have obtained a number of replies, stating the effects obtained in numerous cases which I will summarize. My own cases are only six in number, and all of them, with one exception, are still under treatment, but the results are so marked as to indicate a decided influence upon the disease by this remedy. In several of the cases it will be noted that they were first placed under the treatment which I have used for a number of years, and in two it will be observed that they had already been relieved or apparently cured from the same disease by this treatment in former years. The cases are as follows:

Case I.—L. A. W., a man, aged thirty-six years, came to me February 19, 1889, complaining of a sense of fullness in the throat, hoarseness, and difficulty of breathing, though his general health was good; weight, two hundred and twelve pounds. At that time he was suffering from laryngo-bronchitis. On February 28th it was noted that he had acute swelling of the thyreoid gland, for which he was given the iodide of potassium, in doses of from five to eight grains, after each meal, with a twenty-fourth of a grain of arsenious acid, a third of a grain of extract of nux vomica, and three grains of extract of quebracho. Four days later the left lobe was smaller and the breathing was somewhat easier. The iodide was increased to ten grains at a dose. Similar treatment was continued for the next twelve days, when he was placed upon the tincture of iodine in doses of from five to twenty drops, given in capsule after each meal. A week later the gland was injected with thirty minims of a five-per-cent. solution of carbolic acid. Six weeks later the swelling in the thyreoid had mostly disappeared. Two weeks later it is noted that the neck measured eighteen inches and five eighths, and there was no difficulty in breathing. The treatment was continued, and two weeks later, May 8th, he stated that he thought the neck was well. Ten weeks later it was noted that the swelling of the thyreoid had very nearly disappeared, and he had lost twenty-five pounds in weight. A month later no return of the enlargement of the thyreoid; weight, a hundred and eighty-five pounds.

The patient disappeared, but returned on the 10th of October, 1891, when it was stated that the neck had been swelling for the last four or five weeks; this soon disappeared under treatment similar to that used formerly.

I saw the patient in March, 1894, but there had been no return of the goître. On May 13, 1895, the patient called upon me again, saying that for three or four weeks there had been some difficulty in breathing. The collar seemed very tight, and it was observed that there had been considerable enlargement of the thyreoid gland. The neck at this time measured seventeen inches and a quarter at the largest place. The patient weighed two hundred and six pounds.

He was given the desiccated thyreoids in doses of three grains three times daily. He returned twelve days later stating that at the end of two days the difficulty in breathing had disappeared, and since commencing the medicine the swelling had steadily decreased. His neck at this visit was of normal size, measuring sixteen inches. He departed apparently well and has not since been heard from.

Case II.—E. M., a woman, aged twenty-one, came under my care in April, 1890, because of an enlargement of the thyreoid that had lasted ten or twelve years. She had been frequently troubled with violent cough. There were neither exophthalmia nor heart symptoms, but the pulse was 108, though regular; general health and digestion were good; there were no abnormal signs over the chest; the neck measured sixteen inches.

The enlarged gland was injected with thirty minims of a five-per-cent. solution of carbolic acid, and she was given seven and a half grains of potassium iodide in water after each meal. A week later there had been no change in her condition; the injection was repeated and tincture of iodine given in doses of five to twenty-five drops after eating.

I did not see the patient again until three years later, April, 1893. She stated that she had been fairly well during the interval, but that the gland had begun to swell again recently. The gland was again injected with twenty-five minims of a five-per-cent. solution of carbolic acid, and the tincture of iodine was ordered to be taken in doses of from five to twenty-five drops after each meal. She returned in about a week and the treatment was continued. I did not see her again until February 22, 1894. She stated that from the last treatment the swelling in the gland had much diminished and that she had no trouble for a long time, until about a week previous to this call, when the gland suddenly began to enlarge and caused some difficulty in swallowing. At this visit the gland was injected with twenty-five drops of a three-per-cent. solution of carbolic acid and she was again given tincture of iodine. The treatment was continued, the injection being given about once a week for the next six weeks. During this time there was very little improvement, though the difficulty in swallowing diminished. In the early part of May I found that the uncomfortable symptoms had disappeared. The iodine had been used continuously and there had been another injection of the carbolic-acid solution. June 14, 1894, the neck measured only thirteen inches, and she appeared to be cured.

I did not see her again until May 14, 1895, when the neck measured fourteen inches and a half. She was given at this time two grains of the desiccated thyreoids after each meal, and a few days later the dose was increased to three grains. A week later it was noted that the circumference of the neck had diminished a quarter of an inch. At that time the desiccated thyreoids were increased to four grains three times daily. A week later, pulse, 104; neck measured the same. Seven days later, pulse, 116; neck measured only fourteen inches. She had been taking only two grains of the desiccated thyreoids three times daily for the past week and no injections had been used. She is still under treatment.

Case III.—W. R., a lad, aged fifteen years, came to me January 9, 1895, complaining of shortness of breath and wheezing respiration upon exercise, with enlargement of the thyreoid gland, which had been present for five years.

I found that his mother apparently had consumption and a maternal great-aunt and cousin had suffered from goître. The patient's general health was good, he weighed a hundred and forty-seven pounds, and the pulse was 90. Action of the heart regular, with no abnormal physical signs. The neck measured at this time fifteen inches and a half. Patient was given five grains of iodide of potassium after each meal, and thirty minims of a three-per-cent. solution of carbolic acid were injected into the thyreoid gland. Similar treatment was continued, the injection being made weekly until the 16th of February. At that time, after five weeks' treatment, the neck still measured fifteen inches and a half, and no perceptible improvement could be noted. He was then placed upon the use of desiccated thyreoids, three grains three times daily; the carbolic-acid injections were continued once a week. A week later he had noticed a decided decrease in the size of the gland and the neck measured only fifteen inches. The dose of desiccated thyreoid at this time was increased to four grains after each meal. A week later the patient was too ill to come to the office, but it was reported that the neck had gradually decreased in size. He had suffered from faintness and much from headache all the week. A week later, March 9th, he was still feeling so poorly that the dose of the desiccated thyreoids was decreased to two grains.

He complained of having felt very weak and faint during the last few days. A week later he was free from headaches and faintness, therefore the desiccated thyreoids were increased to three grains three times daily.

The gland was still decreasing in size. One week later, March 26th, about five weeks after the treatment was begun, he reported that he had lost fourteen pounds in weight, but he was feeling pretty well excepting for frequent headache. At one of his recent visits I had noticed that he trembled a great deal during the consultation, and that he had the nervous appearance and arterial pulsations of one suffering

from exophthalmic goître, but there was no prominence of the eyes. At this time the desiccated thyreoids were reduced to two grains three times daily. The next week he again reported having had headaches two or three times during the week.

The neck was found to have been reduced to fourteen inches and an eighth, and about four fifths of the enlargement of the gland had disappeared.

April 6th.—The neck still measured fourteen inches and an eighth; he had at this time gained three pounds in weight; his pulse was 140, and he was quite tremulous. Two weeks later the trembling had all disappeared, and there were no unpleasant symptoms; the treatment was continued.

May 4th.—Patient has had no headache the past week; the neck measures only thirteen inches and three fourths.

He is still taking two grains of desiccated thyreoids three times a day, and is also taking bitter tonics most of the time. He has had the gland injected with the carbolic-acid solution nearly every week.

11th.—The dose of the desiccated thyreoids was increased to four grains three times daily. On May 19th he again reported having had headaches, nevertheless the desiccated thyreoids were increased to five grains four times a day.

25th.—He had a headache nearly every day after the last prescription. The neck was found to measure fourteen inches and a quarter, half an inch increase in the last two weeks; weight, a hundred and thirty-four pounds and a half, twelve pounds and a half less than when he began treatment. The desiccated thyreoids were decreased to four grains three times daily.

June 1st.—The patient's general health is good and there is no exophthalmia or trembling. The thyreoid gland has been reduced at least four fifths.

14th.—The patient has no unpleasant symptoms and the size of the goître has been reduced fully ninety per cent. He is still under treatment.

Case IV.—R. P., a woman, aged twenty-seven years, came to me on January 17, 1895, complaining of swelling of the right lobe of the thyreoid gland which had existed for about five years. It had caused no special inconvenience, but was slowly enlarging. There was no hereditary predisposition to the trouble; her general health was good; weight, one hundred and twenty-two pounds; pulse 95, no exophthalmia, digestion natural.

The neck over the largest part of the thyreoid gland measured fourteen inches and five eighths, and the swelling was limited to the right lobe. At this time she was given tincture of iodine internally, in doses of from five to twenty-five drops, to be taken in capsules after each meal, and the gland was injected with twenty-five minims of a three-per-cent. solution of carbolic acid.

The treatment was continued until February 12th; the solution of carbolic acid, however, had been increased in strength to four per cent. At this time there had been no diminution in the size of the gland. It was injected with thirty-five minims of a five-per-cent. solution of carbolic acid, and the tincture of iodine was continued. About a week later, on February 21st, the injection was repeated, and she was given the desiccated thyreoids in doses of from two to six grains after each meal. The iodine was also continued. At this time the neck measured fifteen inches, three eighths of an inch more than when treatment began. Six days later the neck measured only fourteen inches and three fourths. She had been taking six-grain doses of the desiccated thyreoids for the last few days. The gland was then injected with fifty minims of a five-per-cent. solution of carbolic acid, and the iodine was discontinued. A week later she said she noticed a very marked improvement; the gland was injected. The measurement of the neck had diminished to fourteen inches. One week later the digestive organs were much disturbed, she was feeling very poorly, the pulse was 120, and the temperature was 100·2°. She had been taking six grains of the desiccated thyreoids three times daily. At this time the dose was reduced to four grains. One week later she reported herself as feeling considerably better; treatment continued. A week later she complained that she had a bad headache every morning for the last week, though she had hardly ever suffered from it previously. The dose of the desiccated thyreoids was reduced to three grains after each meal. The injection of the gland was repeated. A week later the amount of the desiccated thyreoids was increased to four grains three times daily; the injection was repeated, and it was noted that she had lost three pounds in weight. At the next visit she complained of being very tired, though she suffered but little from headache.

Maltine with the hypophosphites, in doses of from one to four drachms, was given after each meal. A week later the dose of the desiccated thyreoids was increased to five grains four times a day, and the injection was repeated. A week later she reported herself as feeling well; she had lost no more weight; a week later, on May 7th, she weighed a hundred and twenty-nine pounds, or seven pounds more than when the treatment was begun. A week later, on May 14th, the neck measured only thirteen inches and a half. She had been taking five grains of the desiccated thyreoids three times daily; the dose was increased to six grains, and she was given the injection of five-per-cent. solution of carbolic acid, thirty minims as before. Subsequently the patient called once a week and treatment was continued.

June 11th.—The appetite good, the weight as before; there has been little headache and no other unpleasant symptoms; the measurement of the neck remains the same, thirteen inches and a half; but the gland seems to have diminished in size about 85 per cent. from the beginning of the treatment with the desiccated thyreoids. Still under treatment

Case V.—B. W. G., a man, aged twenty-six years, came under my care on March 18, 1895, complaining of palpitation of the heart and occasional dyspnœa. He exhibited marked exophthalmia and enlargement of the thyreoid gland, the latter varying with exercise. He had been affected for three years, but had never suffered from any other disease excepting rheumatism, of which he had an attack the previous fall, lasting two weeks.

His mother and two sisters have also had goître. He used neither stimulants nor tobacco, but took about three cups of coffee daily. His general health was good; weight, one hundred and fifty-two pounds; pulse, 102, very irregular; temperature normal; at times wheezing respiration and slight cough; he had been troubled somewhat with looseness of the bowels ever since the goître was first noticed. Over the upper portion of the goître the neck measured fourteen inches and three quarters, over the lower portion fifteen inches and three quarters.

Upon examination of the chest the cardiac pulsations were noticeable all over the præcordia, and cardiac dullness was found to extend three quarters of an inch to the left of the normal position. There was some want of synchronism in the action of the two sides of the heart noticeable at times, but there were no abnormal murmurs. Upon examination, the rapidity of the heart's action increased to 160 or 170 a minute. He had been taking ten-minim doses of tincture of strophanthus for some time. He was given desiccated thyreoids, two grains with each meal, also tincture of strophanthus, ten minims, fluid extract of cactus grandiflora, three minims, tincture of digitalis, seven minims and a half, in elixir of pepsin enough to make two drachms, three times a day. Coffee was interdicted. He was directed to report in a week, but he did not return until two weeks later, when he stated that he had taken cold shortly after the last visit and had been coughing ever since.

The swelling of the thyreoid gland had markedly diminished. The neck measured half an inch smaller at the upper part and five eighths of an inch smaller at the lower part. During this time he had lost eighteen pounds in weight. He complained of poor appetite and frequent vomiting after breakfast. He was given maltine with hypophosphites, the use of desiccated thyreoids was continued, and he was also given for two or three days ten-minim doses of tincture of strophanthus with a third of a grain of extract of nux vomica, two thirds of a grain of extract of hyoscyamus, one grain of camphor, and four grains of ingluvin. He was directed to return in four days, but he did not. About a week later I was informed that he had become very ill and seemed in a critical condition. I told his friends to have the medicine discontinued at once, and I think this direction was followed. I did not see him again for four weeks, when he stated that he had lost five pounds since the last weighing, but his cough had ceased and he was

feeling very much better. He told me that he had been confined to the bed for two weeks after the last visit, but subsequently had much improved, the appetite returning shortly after discontinuing the desiccated thyreoid. There had been no renewed enlargement of the thyreoid gland up to this time; the pulse was slower and the exophthalmia about as at first. All told, the diminution of the thyreoid gland appeared to be about seventy-five per cent.

Case VI.—B. E. J., a woman, aged fifty years, came under my care on May 3, 1895, complaining of difficulty in breathing for the last two years, apparently from obstruction in the larynx. She complained also of cough, especially when eating. There was no pain, the appetite and general health were good, and the digestive organs were in an excellent condition.

Upon examination, I found marked thickening and hardness of the isthmus of the thyreoid gland, which measured about an inch from above downward and about three quarters of an inch in thickness. There were no abnormal signs over the lungs, heart, or aorta. Over the largest part of the growth the neck measured thirteen inches. She was given a third of a grain of extract of nux vomica and two grains of the desiccated thyreoids three times daily. She returned eleven days later reporting that she felt much better. Her cough was looser, though at times she still suffered from shortness of breath. She was given at this time half a grain of extract of nux vomica, half a grain of extract of hyoscyamus, and three grains of desiccated thyreoids. A week later she returned, reporting that she felt much improved, but that she had a weak spell a few days previously and that her appetite was not very good. The enlarged gland had considerably diminished in size, it felt much softer, and the neck at the most prominent part measured only twelve inches and a half.

June 14th.—She is still under treatment and professes to be steadily improving.

I have received personal letters from physicians in various parts of the country containing the following records:

Dr. W. O. Taylor, of Princeton, Ontario, reports twenty-five cases of goitre treated by internal administration of the thyreoid gland in the last twenty weeks. The patients were all females, and in age ranged from fourteen to sixty-one years. The duration of the disease in seven cases extended from six to fifteen years, the rest running from three months to three years. These cases were treated from seven to twenty weeks each, with an average of from five to ten grains of the desiccated thyreoids three times a day for three weeks. All except seven cases were improved.

The greatest reduction in the size of the neck noted was two

inches and three quarters. In six cases it was reduced two inches or over, in ten cases an inch and a quarter or less.

As to the weight, three patients lost an average of fifteen pounds, while a few others lost from one to four pounds. Headache was noted in thirty per cent. of the cases, dizziness in thirty-seven per cent., trembling in twenty-five per cent., while rapid pulse was noted in five cases and weakness in five cases, the weakness being so great in one case as to render the discontinuance of treatment necessary.

Dr. Taylor attributes the prevalence of goître in his locality to the very hard water, and states that in the use of thyreoids he obtained little effect unless the patients drank distilled water. He has had the very large number of two hundred and seventeen cases of goître in eight years.

In addition to the twenty-five cases of goître reported he has also treated with the thyreoids three cases of myxœdema in one family—a brother, sister, and a cousin. These cases were under treatment from three to seven months with doses of from five to ten grains three times a day, the disease having existed from four to seven years and a half. One patient was improved for seven weeks, then became worse. In the second the symptoms were kept stationary. In the third case he found treatment very satisfactory; the mental condition was decidedly improved, and the general swelling of the body largely disappeared.

Dr. J. Williamson, of Ottumwa, Ia., reports two cases of goître treated for twenty-one days, first with five grains, later with two grains and a half, without effect on the goître and with the usual headache, etc. The weight diminished perceptibly.

Dr. F. A. Packard, Kearney, Neb., reports one case of goître treated with ten-grain doses three times a day, but it caused so much trembling, dizziness, and nausea that he gave it no further trial.

Dr. S. W. Connell, of Milwaukee, reports one case in which the circumference of the neck was reduced an inch and three quarters by two months' treatment with five-grain doses. This patient had suffered with chronic headaches for years, so that the influence of the thyreoid on that symptom is uncertain.

Dr. H. M. S. Byron, of Whiteside, Tenn., reports one case of rapid reduction of the goître of twelve years' standing, and some loss of weight, without headache or dizziness, but with some trembling, rapid pulse, and weakness, under sixteen weeks' treatment with two-grain-and-a-half doses.

Dr. Thomas H. Briggs, of Battle Creek, Mich., treated four cases

of goître with the desiccated thyreoids for six to eight weeks with excellent results, beginning with five-grain doses given at least two hours from meal time, three times a day, for the first week; he later reduced the dose to two or three grains. The goîtres were all much reduced in size, and the weight was usually slightly reduced without headache or other disagreeable symptoms, except nausea and dizziness. He found that the disgust for the remedy could be overcome by giving solution of strychnine with it. He had also used the remedy in a case of lymphadenoma, one of carcinoma, and one of tubercular glands of the neck, but without material results.

Dr. Steele Bailey, of Stanford, Ky., treated one case each of goître and of myxœdema, giving five-grain doses three times a day for three months. Treatment then had to be discontinued in both cases on account of the usual ill effects from such large doses, though the goître decreased in size, while the total weight of body increased five pounds. The myxœdema grew worse in spite of thyreoid, belladonna, and other medicaments.

Dr. J. K. P. Rogers, of South Portland, Me., treated a case of myxœdema of nine years' standing in a woman fifty-seven years old. Two months' treatment removed all evidence of the disease, beginning with three grains, given on alternate days, reduced a grain and a half after the first week, and later five grains twice a week. The weight was reduced fifteen pounds in the first month and three pounds in the second. By the use of such small doses at longer intervals the unpleasant effects were entirely avoided; but the case is remarkable for a symptom I have not elsewhere heard described. The patient was seized with intermittent pains, the exact duplicate of those of the third stage of labor both in appearance and in severity. These persisted for four days after treatment had been discontinued, and required morphine hypodermically to control them. Later the dose was diminished on account of sciatic pains and stiffness, which prevented the patient from standing erect, and lastly on account of epigastric pain and palpitation.

Dr. George W. Hall, of Chicago, reports a case in which I recommended the desiccated thyreoids, in which the goître, which had existed for six years, was completely cured by four weeks' treatment by doses of two to three grains. The patient during the treatment had suffered much from headache, with slight dizziness, but no other unpleasant symptoms.

Dr. C. H. Ott, of Chapman Quarries, Pa., treated a case for ten days with thyreoids, with improvement.

Dr. C. A. S. Prosser, of Boise City, Idaho, treated one case for five days with a sample only, without appreciable change.

Dr. A. C. Webber, of Cambridge, Mass., treated one case for four weeks with five-grain doses, with almost complete disappearance of the goître and without headaches or other symptoms but rapid pulse.

Dr. P. F. Metz, of New Haven, Conn., treated two cases with improvement, with two grains two or three times a day.

Dr. Stanley P. Warren, of Portland, Me., gave a few five-grain doses, when the patient became frightened at the terrific face and head congestion and stopped treatment. However, within two weeks the tumor decreased half an inch.

Dr. F. L. Shaw, of Machias, Me., reports one case treated for a month by five-grain doses, the swelling being reduced half an inch, and no disagreeable symptoms except headache.

Dr. C. Walliser, of Sonoma, Cal., reports one case of goître treated by three two-grain tablets daily for a week without effect, except all the disagreeable symptoms; for this reason treatment was discontinued. He also reports a case of myxœdema treated for two weeks, the result being unknown so far.

Dr. C. S. Bolton, of Richmond, Ky., treated a consumptive patient with goître, with improvement.

Dr. R. B. McKeage, of Shickshinny, Pa., treated one case of myxœdema of thirteen months' standing with five-grain doses for twenty days. Patient improved enough to return to work.

Dr. R. A. Lancaster, of Gainesville, Fla., gave the remedy for a short time, but the patient was nauseated and quit treatment.

Dr. Henry G. Ohls, of Chicago, noting the general loss of weight in the treatment of goître by the thyreoids, gave two patients with obesity the remedy in doses of two to four grains three times a day. One used the remedy ten days and gained five pounds, but stopped the treatment on account of severe backache and stiffness of limbs, but without headache or other symptoms. The other lost five pounds in two weeks' treatment, but discontinued it at that time on account of daily rather severe headache. The last patient has recently begun with smaller doses, but I can not yet report results.

Dr. G. L. Williamson, of Homer, Ill., reports one case of twenty-five years' duration, treated for three weeks with six-grain doses, reduced an inch and a half. In this case there was some puffiness of the face, which disappeared under treatment, and the patient, a minister, thought that his mind was more acute.

Dr. B. F. Van Valkenberg, of Long Prairie, Minn., had a fatal case of exophthalmic goître, which he treated for two weeks with the thyreoid, with negative results.

Summary.—With my six cases treated by internal administration of the desiccated sheep's thyreoids, and those reported to me by personal letter, I have, all told, fifty cases of goître, not including one case of advanced exophthalmia, in which the patient died one month after treatment began. In these I find the following results: The swelling was reduced in thirty-eight cases; swelling not affected in eleven cases; no report in one case.

Of the cases where no improvement was noted the remedy was used only five days in one and a week in another. In four cases the goître had existed from six to twenty-five years and perhaps was largely cystic, though not specified.

I have reports of seven cases of myxœdema, with the following results: Improved, five; not affected, one; unknown, one.

Of these, in one case the patient improved for seven weeks and then deteriorated, though treatment was continued for three months. Two cases of obesity without other disease are reported. One of the patients lost five pounds; one gained five pounds.

The symptoms noticed after the administration of this remedy, observed in the various cases reported by me and reported by personal letter, have been: Headache in eighteen; no unusual symptoms in eight; no report, twenty-four; dizziness in twenty; no unusual symptoms in five; no report in twenty-five; trembling in fourteen; no unusual symptoms in five; no report in twenty-one; rapid pulse in eleven; no unusual symptoms in six; no report in thirty-three; weakness in seventeen; no unusual symptoms in ten; no report in twenty-three; backache in one; nausea in seven; no report in forty-three; lost weight in twenty-five; gained weight in two; mind improved in two; nervousness in one; uterine contractions in one.

Conclusions.—From a consideration of the history of this subject and an analysis of the cases which we have presented, the following conclusions seem to us justifiable:

1. Thyreoid products produce marked physiological effects upon the nervous and circulatory systems, as indicated by headache, dizziness, pains in other portions of the body, and great weakness, and by flushing of the face and rapidity of the heart's action.

2. Some of these unpleasant symptoms usually occur when a

daily dose is reached corresponding to one and a half or two entire thyreoid glands of the sheep.

3. If the administration of the remedy in doses that cause such symptoms is continued for a few days, constitutional effects are produced indicating that persistent use of doses of from six to twelve grains of the dried thyreoid (equivalent to one or two thyreoid glands) three times daily might produce fatal results.

4. Desiccated thyreoid glands appear quite as active as the liquid extracts and more stable.

5. Internal administration appears quite as effective as hypodermic medication.

6. For internal use, the adult dose of the desiccated thyreoids should not exceed two grains three times daily at first, but the dose may be gradually increased to two or three times this quantity, provided it does not cause unpleasant symptoms. There is no evidence that moderate doses have an injurious effect.

7. The remedy in some cases has a pronounced effect on the body weight, but this is very uncertain and varies so greatly in different persons, and in the same individual at different times, that there is strong reason for suspecting that the loss of weight which sometimes follows this administration may be due entirely to disturbance of the digestive organs.

8. In the treatment of myxœdema the remedy has undoubted value and appears to benefit quite a large percentage. In these cases it is probable that the best results will be obtained by giving it at intervals for a long time.

9. In exophthalmic goître the remedy causes rapid reduction in the size of the gland, but it has no perceptible effect upon the exophthalmia, and it apparently aggravates the heart symptoms. In this disease it must be used guardedly and its effects must be carefully watched.

10. In many cases of goître internal administration of full doses of the products of the thyreoid is followed by a most remarkable diminution in the size of the diseased gland. Improvement or cure may confidently be expected in seventy-six per cent. of the cases, but sufficient time has not yet elapsed to determine what the final results will be. It is probable that cystic growths in the thyreoid gland would not be influenced by this remedy.

11. Clinical experience has not yet demonstrated that this remedy is of value in other diseases, but its effect in diminishing

the size even of very firm and hard enlargement of the thyreoid gland would certainly justify experimentation in other directions.

Discussion.

Dr. E. L. Shurly, of Detroit, said that he had used the ordinary extract in a few cases with rather disappointing results. In this connection he desired to relate the case of a human being from whom the thyreoid gland had been extirpated by Dr. T. A. McGraw. He would take the liberty of reporting this case here, although he had not asked Dr. McGraw's permission to do so.

Some fifteen years ago, Dr. McGraw had extirpated the whole thyreoid gland in a case of goître occurring in a boy of about sixteen years of age. This boy had resided all his life in a marshy district just outside of the city. This operation had seemed to relieve the boy for about three years, and while he did not grow in stature, he had seemed to develop quite well in other directions. At the end of three or four years thereafter the speaker had seen the boy again. At this time the voice had been very piping. He had been brought to the speaker for an examination of the larynx. The examination had shown that the movement of the vocal cords and arytænoids was normal, but that the tension was defective. From this time the boy had gradually developed into a state of myxœdema. Dr. McGraw, of course, had done all that could be done with the knowledge possessed at the time the operation was made. The boy's mental faculties have not developed to any extent. Three years ago some of the thyreoid structure had been introduced into his neck, but without special benefit so far as the speaker had learned. Since that time he had been given the thyreoid extract quite continuously. Last February he had again examined the larynx of this individual, and had found the tension of the vocal cords to be much better. The boy's mental faculties were somewhat better, although the mind still acted very sluggishly. The case was of interest, inasmuch as it pointed directly to the effect of extirpation of the thyreoid gland, and confirmed the experiments that had been made on the lower animals. He thought the profession should use its influence against extirpation of the whole of the thyreoid gland in the light of present knowledge.

Dr. W. E. Casselberry, of Chicago, said that his experience had been limited to a single case of exophthalmic goître. In this case, the fresh gland had been administered, twice a week, with the result of producing a decided improvement, although not a cure. This had occurred more than a year ago. Dr. Paul Bruns had been studying this subject for a considerable time, and his last report had included some sixty cases. His cases had been classified according to the age. In the first decade, between one and ten years of age, all of the patients had recovered under the use of the thyreoid extract; between

the ages of ten and twenty years, about three fourths had recovered; later in life, the results had not been so good, so that between fifty and sixty years improvement had been observed in only a small proportion of the cases. In view of these interesting observations, he hoped that Dr. Ingals, in closing the discussion, would say something about the ages of his patients. The reader of the paper had also called attention to the fact that there were some dangers connected with the treatment. One writer had reported that a monkey that had been experimented upon had died within ten days. Some cases of apparent heart failure had also been reported as having occurred during the administration of this remedy.

Dr. Shurly remarked that monkeys that had died from natural causes very frequently showed enormous enlargement of the thymus gland.

Dr. Ingals said that he could not answer the question regarding the ages of his patients, as this point had not been specially considered in the preparation of his paper. Dr. Taylor, of Princeton, had treated two hundred and seventeen cases of goitre in the last eight years, and had believed they were caused by the drinking water. He had stated that the cases did not do well under his treatment except where distilled water had been substituted for their ordinary drinking water.

Paper.

THE INFLUENCE OF CHRONIC DISEASES OF THE THROAT UPON CERTAIN DEFECTS OF SPEECH, ESPECIALLY STAMMERING.

By D. BRYSON DELAVAN, M. D.

THE ordinary defects of speech in children suffering from hypertrophic conditions of the pharynx are sufficiently familiar. They are due, in part at least, to obstruction of the vocal resonating cavities, and are relieved more or less promptly when the normal patency of the parts has been restored. Those which depend simply upon the mispronunciation of consonant sounds are the most common, and it is unusual to find a child with any considerable amount of adenoid or tonsillar enlargement who can pronounce the letters *m* and *n* naturally, while certain other consonant sounds are also commonly a source of trouble. On the other hand, there are some consonant sounds, either single or double, mispronunciation of which is not usually attributed to pharyngeal disability. Thus, the combination "*th*" may be pronounced like "*s*," or the letter "*w*" like "*l*," and so on with various other examples. In a number of instances in which such patients have come under the observation of

the writer, it has been noticeable that after the restoration of the normal patency of the pharynx, and return of the parts to a natural condition, these speech defects have disappeared, although no effort has been made to instruct the child or to call his attention especially to the correction of the evil.

In addition to the obstructive conditions due to lymphoid disease, there is another factor in these cases which is not so readily recognized as influencing the phonatory act—namely, the part which relaxation of the throat in general, and of the soft palate in particular, directly due to the organic troubles above mentioned, bears in producing these various classes of mispronunciation. That it may do so is beyond question and need not be further commented upon here. My intention, however, is to direct especial notice to its influence upon a totally different kind of vocal defect.

The precise physiology of the act of stammering has never been satisfactorily explained; more, perhaps, has been written upon the subject, with less profit, than upon most obscure affections. There can be no question that however central the disease may be as to its origin, and however largely a neurosis, it certainly is influenced to an important degree by the local conditions obtaining in the throat. Thus, among stammerers, it is a matter of common observation to find that they talk less fluently when tired, hungry, or ill. A person who may have almost entirely overcome the defect may find himself stammering badly at the onset of a cold attended with marked relaxation of the throat. These and many other conditions tend to suggest that relaxation of the throat may decidedly aggravate the habit of stammering. It goes without saying that the morbid conditions of the throat before alluded to are attended with marked relaxation. This is so pronounced in some cases as to cause a decidedly paretic condition of the soft palate. Reasoning from analogy, it would be fair to suppose that anything which would tend to remove relaxation and add strength and muscular tone to the phonatory muscles would be directly helpful in overcoming the stammering habit. Let it be at once disclaimed that the idea is held that all stammerers have diseased throats. This is emphatically not the case; there are many whose throats are to all appearance perfect; but among the class described, it seems fair to infer that attempts made to relieve stammering might be greatly assisted through the removal of the local disabilities. This, indeed, clinically has proved to be the case. In the experience of the writer, marked improvement in stammering has followed the removal of

obstructive conditions and the relief of other irritating lesions. He has had the matter under observation now for a number of years, and during that time has had an opportunity to study several cases directly bearing upon the proposition, and, while in no case has the stammering been absolutely cured, in all cases a very marked and gratifying improvement has taken place, following shortly upon the performance of operations upon the throat successful in the relief of morbid conditions there. The subject is more important than would at first appear, for it will be seen that a patient sent to a vocal instructor for the relief of stammering may find his progress seriously impeded and the ultimate results of his course of instruction greatly impaired through persistence of his throat troubles, thus entailing disappointment to the pupil and discredit to the instructor in whose hands he may have been placed.

I have thought it worth the while of this association, therefore, to bring before it the following proposition—namely, that in cases of stammering, especially in children, it is well to examine the throat, and, if disease exists there, to eliminate it before the patient is placed under instruction for the improvement of his vocal defect. This can work nothing but good to the pupil and ought to be a source of vast help and encouragement to the conscientious instructor, who can hardly find any reasonable ground for objecting to a course so evidently calculated to sustain and re-enforce his efforts. The suggestion herein contained was made some years ago by the late Emil Behuke. The fact that it appears to have escaped general notice is my excuse for bringing it forward.

In these cases, simple medical or surgical treatment of the throat is not all that is possible. Much can be done to strengthen a paretic or feeble soft palate, and to this end, under the advice of the physician, certain helpful exercises can be carried out. For instance, the application of the galvanic current to the soft palate, the systematic exercise of the organ by the pronunciation of sounds calculated to call it into activity, the old advice of causing the patient to blow through the closed lips—all these things may act as desirable aids. Frequent gargling with cold water has been suggested to strengthen the palate, and, in older patients, the head and falsetto tones are advised as being useful in exercising the levators of the palate and the superior constrictor of the pharynx, thus adding strength to them and placing them under the better control of the will.

Paper.

ELECTROLYSIS BY A CURRENT CONTROLLER FOR THE REDUCTION OF SPURS OF THE NASAL SEPTUM.

By W. E. CASSELBERRY, M.D.

CUSTOMARILY spurs or excrescences of the nasal sæptum are removed by surgical means by the knife, saw, and drill, and I wish to disclaim now, as I did in a recent preliminary report on the same subject, any idea of indorsing electrolysis as a universal substitute for the surgical method, for the latter, in skillful hands, is more rapid, more precise, and in the case of bony spurs certainly more effective than is electrolysis. Certain European operators have advocated the method by electrolysis; a few have praised it with perhaps a degree of extravagance, and yet it would seem that a modicum of actual fact must underlie so much enthusiasm.

My own experiments have been undertaken to determine the scope or, better stated, the exact limitations of this method—in what class of cases it is possible by means of it to avoid a more or less sanguinary operation, and to what extent one can utilize it to reduce spurs and thickened areas of minor degree, those which are scarcely deserving of surgical treatment with its possibilities of troublesome hæmorrhage, but which one would like to see resolved for the sake of the additional nasal space and better drainage which would thereby accrue to the patient.

A *résumé* of the previous literature of the application of electrolysis to the treatment of nasal spurs need be but brief. Miot,* of Paris, was the originator in 1888, and following him Garel,† of Lyons, reported his results in thirty cases; but my attention was first drawn to the method by Moure‡ at the Ninth International Medical Congress at Berlin in 1890, where he read an elaborate paper on the subject and described minutely the technique. Moure and Bergonie# have since embodied their studies in a monograph, published in Paris in 1892, and Moure‖ again in 1894, before the Eleventh International Medical Congress at Rome, discussed in a

* *Revue mensuelle d'otologie et de laryngologie*, cited by Garel (*loc. cit.*).

† *Annales des maladies de l'oreille, du larynx*, etc., tome xv, 1889, pp. 638.

‡ *Verhandlung des X. internationalen medicinischen Congresses*, Band iv.

\# *Du traitement par électrolyse des déviations*, etc., Paris, 1892.

‖ *The Journal of Laryngology, Rhinology, and Otology*, May, 1894.

paper the Comparison between Electrolysis and other Methods of Treatment for the Destruction of Deviations and Spurs of the Nasal Sæptum. Moritz Schmidt, in his book (*Die Krankheiten der oberen Luftwege*), published in 1894, confirms the efficacy of the method as advanced by the French operators, a significant fact which tends to remove the sense of skepticism with which the subject was first viewed in America.

Among others may be mentioned Peyrissac, Meyer, and Heryng, all cited by Newcomb.

Only two papers by American authors have come under my observation; one by Newcomb,* of New York, with a report of two cases and an excellent review of the bibliography and technique, and the other by Ballenger,† of Chicago, with a report of three cases.

All of these operators have employed as the source of the electricity a primary galvanic battery of about thirty cells. The inconveniences of this apparatus, and especially its unreliability when called into use only at irregular and prolonged intervals, has deterred many from trying the electrolytic method. I have sought to avoid these annoyances by adapting the Edison electric-light circuit to the purpose by means of lamp resistance and the McIntosh current controller. The controller, together with a milliampèremeter, cords, and needles, is contained in a small drawer within easy reach as one sits in position for the treatment of patients, and is always ready for immediate use without waste or corrosion. It is as easily and readily applied as the galvano-cautery, except for the few minutes' additional time that its energy needs to accomplish the work. When used it is necessary only to pull out the drawer, adjust the milliampèremeter, and insert the needles.

The current strength necessary for electrolysis of nasal spurs is from fifteen to forty milliampères, measured with the resistance of the spur in the circuit, and, to supply this current, from fifteen to thirty cells of a galvanic battery would ordinarily be used with a corresponding electro-motive force of from twelve to twenty volts or more. A current suitable for electrolysis should be characterized by moderately high tension or voltage and comparatively low current strength or ampèrage.

The Chicago Edison current has an electro-motive force of one hundred and ten volts, which must be reduced by the current con-

* *Medical Record*, August 5, 1893.

† The *Journal of the American Medical Association*, November 10, 1894.

troller. The ampèrage, of course, depends on the amount of resistance in the circuit, but it also can be correspondingly reduced by the resistance of lamps and the controller so that with the spur in the circuit it measures the requisite number of milliampères.

The McIntosh current controller was described at length in my preliminary report. It will suffice now to say that it is composed of a number of resistance coils of varying size, arranged in two rows, with sliding contacts to each, so that the patient may be placed in a shunt circuit to one or more coils. The coils on the left divide the electro-motive force into tenths, and its contacts I have named the decimal slide, while the coils on the right divide the electro-motive force into hundredths, named in consequence the centesimal slide. Thus, if placed in direct connection with the one-hundred-and-ten-volt Edison circuit, and the decimal slide be advanced to 1, enough coil resistance is removed to secure a current intensity of one tenth of a hundred and ten volts, equal to eleven volts. In like manner, if advanced to 2, two tenths of a hundred and ten volts is secured, equal to twenty-two volts. If now the centesimal slide be advanced to any given contact, say 4, there will be added four hundredths of a hundred and ten volts, or four volts, equal now to twenty-six volts.

But the decimal division of an initial one-hundred-and-ten-volt circuit is still too painful to the patient on advancing the contacts, so I have resorted to the expedient of placing a sixteen-candle-power lamp in the circuit (in series), the resistance of which reduces the original electro-motive force aside from the action of the controller to an initial current of fifty-five volts. The result is, that on advancing the decimal slide of the controller to 1, enough coil resistance is removed to secure a current of one tenth of fifty-five volts, or, on advancing to 2, two tenths of fifty-five volts, equal to eleven volts; and on advancing the centesimal slide there will be added at each successive coil contact one one-hundredth, two one-hundredths, three one-hundredths, or four one-hundredths of the initial fifty-five volts, or, if stopping at 4, equal to two volts, which, added to the eleven volts of the decimal slide, makes in all thirteen volts. This is about the arrangement of the mechanism with which I have treated most of my cases. The controller has been constructed and has been thoroughly tested with a view to absolute safety, the details of which have previously been described.

I have used exclusively the bipolar method, as it is conceded by all to be equally if not more effective than the monopolar, and it is more convenient to the operator and less disagreeable to the pa-

tient. Not more than two needles, one representing the positive and the other the negative pole, should be employed, as there is no advantage in the use of multiple points, and it is thought to be more difficult to estimate the exact amount of destruction when more than two points have been inserted.

The parts of the needles intended for insertion into the spur should be from fifteen to twenty millimetres in length, about half a millimetre in thickness, and they should lie parallel and distant from each other about three millimetres.

The material which I have found best adapted to the purpose, all things considered, is irido-platinum, in which enough iridium is placed to make the composition very hard and stiff. A very sharp point can be given this substance, and its penetrating power is almost equal to steel. Not being oxidizable, irido-platinum needles can be used repeatedly, and hence can be permanently soldered to metallic conductors running through a light handle, which then constitutes the needle-holder. I have devised and had constructed by the McIntosh Company such an instrument, which meets all requirements, and

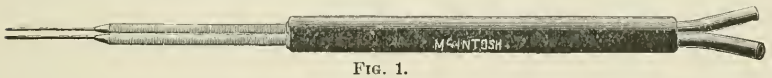


Fig. 1.

it has the advantage of being always ready for immediate use, without loss of time in screwing and unscrewing steel or gold-plated needles into an adjustable needle-holder (Fig. 1). Moure and others recommend steel needles, especially such as are used by sailmakers. That connected with the positive pole will oxidize, which does not harm the patient, but necessitates replacing the needle by a new one at each treatment, and I have been unable to obtain a neat, light adjustable needle-holder which would firmly fix and carry two needles, and to use separate needle-holders is awkward. Even steel will not penetrate bone, and irido-platinum will easily penetrate cartilage.

I have treated by the electrolytic method ten cases, and for the sake of brevity, and to enable us the better to draw definite conclusions therefrom, these may be classed in three types according to the composition and location of the spur and the degree of success attained. Three of these cases have already been reported in detail, so that others will be selected for elaboration as representatives of the various types.

Type I. Strictly Cartilaginous Spurs.

Case I.—Mr. R., a medical student, has witnessed in my clinic at the Northwestern University Medical School operations for the removal of sæptal spurs by both the surgical and electrolytic methods, and he willingly submits his spur to treatment by the latter process. It happens to be of the strictly cartilaginous class, the sort of spur best adapted for reduction by electrolysis.

It is an ovoid excrescence, truncated or flat at the base, projecting from the right side of the sæptum, a distance at its point of greatest thickness of about five or six millimetres, sufficient to occlude almost entirely the right nostril. It is confined to the quadrangular cartilage and is implanted upon the convexity of a slight but, in itself, not material deviation of this part of the sæptum.

Electrolysis by means of the Edison current and McIntosh current controller, one sixteen-candle lamp in the circuit; bipolar method, with the author's needles of irido-platinum, which were inserted into the body of the spur well toward the bottom, the thickest part, one needle above the other and extending almost through the spur, a distance from the front to the back of about eighteen millimetres. A ten-per-cent. cocaine solution on cotton had previously been applied to both sides of the sæptum for fifteen minutes. The decimal slide of the current controller was pushed to 1; the needles then being inserted, the milliampèremeter registered twenty milliampères; the slide was then advanced to 2, which equals a current of eleven volts, the meter registering forty milliampères. On making contact 2, a slight shock was felt. No further increase was made in the current in this case, as forty milliampères is adequate. This was maintained for eight minutes, during the last five of which the patient complained of feeling faint, but it was not necessary to change position or suspend the treatment. The pain was slight, the patient not regarding it as of any moment. There was evolution of gas with crackling sounds, and at the end of eight minutes the larger part of the spur had assumed a mottled bluish and whitish aspect.

At the end of one week the slough had not yet separated, although some shrinkage in size was apparent. Annoyance occasioned by incrustation was at once relieved by the use of an ointment of yellow oxide of mercury in vaseline, two grains to the ounce.

At the end of two weeks the slough had disappeared, leaving a granulating, grooved surface through the lower part of the spur. The loss of substance is pronounced; had it been more so, perforation must have resulted.

At the end of three weeks the treatment was repeated, but for a shorter period of five minutes, to the upper part of the spur, which is not so thick. This followed much the same course, and the result is

satisfactory, abundance of space and a fairly even surface having been obtained.

The chief difficulty in the reduction of cartilaginous spurs is to determine exactly when sufficient destruction has been effected. One does not wish to produce a perforation, and a close watch should be maintained in the opposite nostril and the electrolytic action discontinued on the slightest mottling in hue or escape of gas from that side of the sæptum. But there is reason to think that too great destruction can be effected even short of the production of these danger signals, and other safeguards, such as not inserting the needles too deeply, nor permitting the treatment to endure too long, should be kept in mind. The duration necessary depends somewhat, of course, upon the current strength; but with the meter registering from fifteen to forty milliampères I have not found it necessary to exceed from six to eight minutes for the devitalization of cartilage. The continental authors cited mention fifteen to twenty-five minutes as the duration of their séances, which would seem unnecessarily long.

To Type I may be assigned four other cases of the entire number treated.

Case II of this type.—Mr. A. G. M. complained of inability to breathe through the right side; the cartilaginous sæptum was deflected to the right and, in addition, situated toward the base of the convexity was an excrescence which projected sufficiently forward to approach the partially collapsed ala and so close the nostril. Electrolysis was selected because of the nervous disposition of the patient, he having so little self-control that the surgical method might have involved unusual difficulties. The reduction of the excrescence was effected in three treatments at intervals of about three weeks, the process being unusually tedious for the size of the spur because only six-minute applications, with from ten to twenty-five milliampères, were employed, unusual care being necessary, on account of the adjoining deviation of the sæptum, not to produce a perforation. It has been wisely alleged as a disadvantage that perforation is especially liable to result from electrolysis; but this case satisfied me that it could be avoided by proper care in any case in which it would be avoidable by the surgical method.

The result was satisfactory; by the removal of the excrescence without interference with the deflection, enough space was gained for comfortable respiration.

Case III of Type I was quite an elderly gentleman, who was under treatment for nasal polypi. A cartilaginous excrescence, which pre-

vented the ready transmission of light and the passage of instruments to the seat of polyp growth, was effectively reduced by electrolysis. His age and somewhat feeble condition led to the adoption of this substitute for the surgical method in his case. His was the only one of the ten cases in which there was any noticeable reaction after the treatment. His temperature rose slightly, he complained of heat, pain, and tenderness of the nose, and of a sense of malaise and headache for a day or so.

Case IV of Type I was a small cartilaginous excrescence with which I might not have deemed it necessary to interfere by the surgical method, yet the patient is much improved by its reduction. The only noteworthy feature is that the slough did not separate as a whole, but seemed to liquefy and be in part discharged and in part absorbed, without complete destruction of the mucous membrane, which has therefore been reproduced more perfectly than is usual after the cutting operation. This is an advantage, as the tendency to incrustation so frequently observed after the surgical method due to the poor quality of reproduced mucosa will be avoided. It is an advantage, however, which does not invariably follow electrolysis, since if the slough produced be large it will separate as a whole, with corresponding complete destruction of the surface mucosa.

Case V of Type I presented no features not already noted in connection with the others.

Type II. Mixed Cartilaginous and Bony Spurs.

Case VI.—Mr. M. J. H., aged twenty-five years, has lived in Colorado for two years on account of suspected incipient pulmonary tuberculosis, but has now resided in Chicago again for a year and a half. Maternal grandfather, mother, and sister died of tuberculosis. The physical signs and general condition indicate tuberculosis in a comparatively quiescent or arrested state. He now complains especially of nasal obstruction and consequent irritation of the throat, which is due to hypertrophic rhinitis aggravated by a sæptal spur. This excrescence is of the kind which commences anteriorly and runs upward and backward, following the sutural line of the vomer and cartilaginous plate of the sæptum, gathering volume and thickness and terminating opposite the middle turbinal, into which body its point presses, reaching at this plane quite across the nasal space.

March 1st.—The same needles as were used in Case I were inserted into the projecting point of this excrescence. They met bone and could not be inserted as deeply as desired. The controller was adjusted gradually as in Case I to a maximum electro-motive force of thirteen volts, at which time the current registered from twenty to thirty-five milliampères, the action being maintained for seven minutes. The patient is uncomplaining, and he regarded the pain as trivial. No hæmorrhage.

6th.—He suffered no discomfort after the treatment. The excrescence point is soft and smaller.

19th.—The spearlike point of the excrescence having been destroyed, a second application was made in like manner to the part of the ridge next adjoining anteriorly.

April 30th.—The final result is fairly satisfactory, the spur being very much reduced in prominence, but not wholly removed. Both cartilage and bone entered into its composition, and the reduction in volume was probably commensurate with the proportion of cartilage contained in it.

Doubtless a flatter surface might have been made by the surgical method, but on account of the latent tuberculous state of this patient one would not have wished to risk either the shock or possible hæmorrhage of the surgical method.

Case VII.—Mr. H. had a spur similar in location and composition to the last described; only the anterior lower part of it, however, yielded to electrolysis. The larger part of it proved to be of bone, which was unaffected by the treatment. Slight improvement only.

In one other case of this type the treatment is not yet completed, but the indications point toward a partial reduction only.

Type III. Bony Spurs.

Case IX.—Mr. E. R., aged nineteen years, has been under treatment for hypertrophic rhinitis, adenoid vegetations, and hypertrophy of the tonsils, which are now remedied. He has also a sæptal spur of the kind which commences anteriorly and runs upward and backward, terminating opposite and projecting into the middle meatus of the right side.

March 20th.—Electrolysis applied to the spur—eleven volts, twenty milliampères, for four minutes—when the patient so nearly fainted that it was necessary to discontinue the treatment. The needles would not penetrate thoroughly into the spur, the bone seemingly being of ivory-like hardness.

April 27th.—The spur is practically unchanged, and electrolysis again attempted, the method with two lamps in the circuit for the more gradual application of the current being selected. This treatment was also a failure, for the needles could not be made to penetrate adequately, and besides the patient nearly fainted after three minutes of a current of only eight volts and ten milliampères. A subsequent effort to insert steel needles into this spur resulted in failure.

Case X of Type III was a similar bony spur in which, failing to get a proper insertion of the needles, the process by electrolysis was abandoned and the surgical method substituted.

Conclusions.—1. As demonstrated by the cases reported under Type I, strictly cartilaginous spurs can be thoroughly removed by electrolysis—one, two, or at most three operative sittings being required. It is more tedious and less brilliant than the surgical method, but is not accompanied by any liability to immediate hæmorrhage and by only a remote possibility of secondary hæmorrhage. It is not to be indorsed as a universal substitute for the surgical method in even this limited class; but the number of individual cases, both in this type and in Type II, for which it is applicable is large, and with the efficiency, convenience, and compactness of the McIntosh current controller which adapts the Edison electric circuit to its use, together with properly constructed irido-platinum needles, I consider it a valuable addition to our resources.

2. As demonstrated by the cases reported under Type II, it will not thoroughly remove spurs which belong to that large class of mixed cartilaginous and bony substance; but it will reduce them in size, the amount of reduction being commensurate with the proportion of cartilage of which they are composed. The majority of such cases would therefore better be treated surgically, as being the more thorough method; but instances will arise in which the surgical method being declined or being for some reason inexpedient, benefit may accrue from the use of electrolysis.

3. As demonstrated by the cases reported under Type III, spurs composed wholly or largely of hard bone can not be successfully treated by electrolysis, for the reason that needles can not be caused to penetrate properly, and further, it is doubtful if the process is adequate, even if the needles should penetrate, to the resolution of hard and dense bone.

4. Spur or excrescence, and not deviation of the sæptum, is the subject of this paper. Electrolysis is powerless to correct deviated sæpta of any form.

Discussion.

Dr. J. E. Newcomb, of New York, said that he had done some work in this direction. One of the most valuable features of the paper was the emphasis that it had laid upon the limitations of this process. On this side of the water it was impossible for us to credit absolutely the statements made by certain French writers, who distinctly stated that deviations and bony excrescences could be removed. There were many cases in which deviation of the sæptum was combined with a thickening, where electrolysis would remove some of the thickening, and so relieve some of the symptoms of obstruction. In his own work in

this line he had employed the ordinary current from a galvanic battery, but he had demonstrated that excrescences which were almost wholly cartilaginous could be entirely removed. He had used steel needles, held together by silk threads. The oxidation of the steel needle was harmless, because the resulting salt was an iron compound, and exerted only a styptic effect. It was very important, as stated in the paper, to watch the sound nostril while the process was going on, for the first appearance of a minute bubble indicated an approach to the danger line of perforation.

Dr. William H. Daly, of Pittsburgh, said that he thought it was largely a matter of personal preference as to what one selected for the removal of spurs in the nose. He had used electrolysis considerably up to about fifteen years ago, and while he had not abandoned it entirely, he felt that with the cartilage knife, saw, and trephine at our command it was like a waste of time to resort to electrolysis—indeed, he believed that electrolysis was more a theory than a fact, and in the treatment of spurs and bony protuberances in the nose, where he had succeeded, it had not been due to true electrolysis, but to a condition akin to a mild cautery action. If this be admitted, then why subject the patient to the danger of inflammation of the middle ear, to traumatic septicæmia, and to prolonged discomfort, when by a slight application of cocaine, followed by the employment of a sharp knife or saw or trephine, the spur could be quickly and easily removed? Those who, like himself, had been specialists in this department for many years were inclined to throw aside many of the frivolous and toylike appliances, and to rely more and more upon simple common-sense and efficient methods. The instrument just presented was certainly a beautiful one, but he did not think it would answer in his city, where the street current was not a continuous but an alternating one. Nor could he see any superiority of this instrument over an ordinary galvanic battery and current controller. He had got into great trouble on one or two occasions from the use of a milliampèremeter, an instrument that he did not now trust any more than he would a gas or water meter. One's sensations were certainly more reliable in practice, until electricians could make a more accurate instrument than the milliampèremeter furnished us at present.

Dr. Shurly said that he could not see the sense of resorting to electrolysis of bony tissues; it seemed to him about as sensible to attempt to amputate a thigh by cauterization as to remove these spurs by electrolysis, when it could be so much more easily and quickly done with the knife or saw.

Dr. Jonathan Wright, of Brooklyn, said that he had had a slight experience with electrolysis, and it had proved very unsatisfactory. Occasionally, however, there were cases where it seemed desirable to avoid a cutting operation. Recently a woman, eighty years of age, had applied to him for the removal of a nasal spur. In such a patient it

seemed to him that some such method as that suggested in the paper would be preferable to a cutting operation. The only possible drawback was that there were likely to be foci of bone in these spurs in persons of advanced age. For certain special cases, therefore, where the surgeon wished to avoid shock, this method by electrolysis was useful. During the past spring he had seen a case in which the element of shock had proved quite important. It had been a case of extensive deviation and adhesion to the inferior turbinated bone, in which it had been necessary to perform three operations. The patient had been a rather stolid boy of sixteen years. He had done well up to the third operation, and then had suddenly begun to grow pale and to lose flesh, and at the same time he had begun to pass a large quantity of saccharine urine. This case was mentioned to show that these intranasal operations sometimes caused a good deal of shock. The most vital objection to the electrolytic method was its inability to cope with bony spurs—the variety most difficult to treat by any method.

Dr. Ingals said that he had had no experience with electrolysis for this purpose, but that in some cases of cartilaginous obstruction it could be removed by the galvano-cautery in one tenth the time that would be needed for the electrolytic needles. A galvano-cautery electrode with a small point, half an inch long, could be brought to a white heat and passed directly into the cartilage. This would cause absorption or destruction of the projection with no more discomfort than that from an ordinary cauterization. There were few if any cases where simply puncture with the galvano-cautery was not quite as efficient as the operation with electrolytic needles, and the operation was much less painful and infinitely shorter.

Dr. J. H. Lowman, of Cleveland, said that the general opinion seemed to be that electrolysis could effect no resolution of bony spurs. Those in whom he placed the most confidence had certainly dispensed with this method entirely for the removal of bone and only resorted to it as indicated in the paper.

Dr. S. H. Chapman, of New Haven, said that if any portion of the head was introduced into the electric circuit, unless the current began at zero and was increased very gradually, a certain shock would be produced. This, no doubt, explained the sense of faintness of which the reader of the paper had spoken. The instrument exhibited did not admit of such fine gradations of the current as were required if one would avoid this shock, and to that extent it was defective. An instrument made by Vedder, of New York, was admirable in this respect. The principle upon which it acted was a variation in the current produced by pressure upon pulverized charcoal. He had used this controller a great deal in treatments about the head and without causing any faintness.

Dr. A. B. Thrasher, of Cincinnati, said that he wished to express his appreciation of the paper, and also to ask if the bipolar method pro-

duced as much pain as the monopolar method. He had used only the latter, and, although not on spurs, he could hardly conceive of its being less painful than the operation with the knife. Of course, there were certain patients who would not consent to the use of the knife, and yet who would permit the use of another method, even though it were just as painful.

Dr. J. W. Farlow, of Boston, asked if there had been any instances of severe hæmorrhage following this method of treatment. He had observed severe hæmorrhage in one or two cases in which he had used the saw in patients who could by no means be called "bleeders." In case it was important to operate further in these cases, would electrolysis be sufficiently trustworthy?

Dr. Daly said that he had recently used in cases of operation, where there had been hæmorrhage in the nares, a splint of aluminum folded upon itself. The splint was covered with absorbent cotton; the latter, wrapped with fine thread, was first cleansed, then soaked in an antiseptic solution, preferably a mixture of oil of eucalyptus, tar, and compound tincture of benzoin, and then introduced into the nose upon aluminum slides.

Dr. Casselberry said that the object of his paper had been to determine the scope and limitations of the treatment. He had found that bony spurs could not be removed, that spurs composed of a mixture of bone and cartilage could be reduced, and that spurs consisting entirely of cartilage could be completely removed. He had stated that the electrolytic method was not applicable to all cases, the ordinary surgical method being preferable for many. He wished to take exception to the statement made by Dr. Daly that the surgical method was "safe." Some years ago he had had a case of cartilaginous spur, which he had removed by the knife, and in which there had been a most persistent and profuse hæmorrhage for three days in spite of careful packing. The patient had subsequently developed an inflammation of the ear. He had knowledge of similar cases from which it was evident that the surgical method could not be truthfully described as "safe." The danger of hæmorrhage was much lessened by the more recent method of antiseptic packing with iodoform gauze immediately after the operation, but patients would often object to this treatment, especially if the operation was done for a comparatively trifling spur.

No answer would seem necessary to the statement that "electrolysis was a myth," that "when effective it was by cauterization," for true electrolysis was wholly distinct from cauterization, although it was possible by carelessness or inattention to so heat the electrolytic needles that they would cauterize. If one used only his "own body" as a milliampèremeter such an effect might easily ensue for want of sufficient delicacy in regulating the current.

In removing cartilaginous spurs by the real galvano-cautery he had not had such good results as Dr. Ingals had. There had been much

more inflammatory reaction after cauterization than after electrolysis, and the patients had often complained bitterly of the soreness produced. There could be no question about the efficiency of the cauterization treatment. The cost of the current controller that he had exhibited was not more than that of a good primary continuous-current battery. The objection raised that the instrument was not sufficiently delicate was a very practical one, but it could probably be remedied by placing in the circuit an additional rheostat. He had not as yet referred to the safety of the apparatus when used with the one-hundred-and-ten-volt street current. It was supplied with a fuse designed to melt if the current should accidentally reach a dangerous strength. He had not employed the unipolar method, and hence could not speak of the relative advantages of the unipolar and bipolar methods. It seemed to him more reasonable to employ the bipolar method, as the current was confined to the immediate neighborhood of the two needles inserted into the spur. By the bipolar method less ampèrage was required, and the operation was shorter and should be less painful.

Paper.

IS ACUTE AMYGDALITIS IN ANY WAY DEPENDENT ON THE RHEUMATIC DIATHESIS?

By G. B. HOPE, M. D.

FOR some time past I have been disposed to question the theory of very universal consent that amygdalitis has for its leading predisposition the exhibition of a rheumatic or gouty diathesis. This element of causation is entertained not alone among the so-called old school of practitioners, but is equally emphasized in the majority of recent text-books of our own and foreign authors.

The question involves more than the simple argument of individual belief, since it carries with it a direction of treatment and the employment of remedies that, if not decidedly useful in meeting the real indications, should be held in some reserve until by a comparison of results their intrinsic efficacy is positively demonstrated.

It is a subject of frequent comment among those brought in contact with graduate students that there exists a prevailing disposition to fall into beaten lines of practice, and to accept general statements without stopping to inquire into principles the truths of which may be demonstrated by every-day experiences. To what extent this particular theory of a rheumatic diathesis is based upon sentiment can not, of course, be settled in positive terms by the observa-

tions of a few, but, so far as they go, they may contribute in unfixing the prevailing hard-and-fast rule and invoke a discrimination in favor of a properly selected class of cases.

While a definition of rheumatism must be somewhat vague, its subjective symptoms are generally sufficiently clear to be recognized in a majority of instances when associated with an acute disorder like that of amygdalitis. Although there appear during the year, scattered through a special throat clinic neighboring upon two thousand cases, a sufficient number of typical anginas, it may be said in the writer's individual experience that it is regarded as exceptional to find an instance answering to the rheumatic history. So fixed is this opinion that, as a test to a disinterested standpoint, successive cases have been turned over for the most searching examination to the advocates of the rheumatic theory with altogether a negative result. If a local acute manifestation of this rheumatic state occurs, it might, under ordinary circumstances, be looked for preferably in a sero-fibrous, not a muco-fibrous, tissue, such as constitutes the major part of the tonsil, unless it is conceded that the tonsil assumes a selective area. One hears comparatively little of acute rhinitis or nasopharyngitis as offering either pathologically or therapeutically the same aspect that surrounds the accepted views regarding the inflamed tonsil. On the other hand, it is equally rare to meet with examples of recurring angina in those who carry recent or present unmistakable evidence of a rheumatic attack. In other words, the predisposition bears, if anything, a diminished ratio to the average individual, owing, no doubt, in part to the more than usual care exercised to guard against exposures and excesses. In addition, also, it is noteworthy that intrinsically the tonsil in later life becomes less and less subject to inflammation, notwithstanding the fact that the gouty and rheumatic age is more confirmed. Of suppurative periamygdalitis the course and culmination point so clearly to an infectious origin as to emphasize with every distinctness a condition only accidental if associated with a rheumatic manifestation. The fact is well established that intranasal operations, as refracture of the sæptum, are extremely likely to be followed by an abscess in this location. Consequently, if the proposition as given is correct, the utility of the usual class of remedies addressed to a rheumatic diathesis in the hope of arresting or controlling an acute amygdalitis is either erroneous in its practice or must be understood to act independently and by methods not distinctly stated. It is possible the latter is the case, inasmuch as it is scarcely reasonable to attribute

a happy result to a mistaken appreciation and the natural disposition to progressive resolution. However this may be, it is a sufficiently frequent occurrence that the administration of guaiac and the salicylates is apt to nauseate and interfere to a greater extent with the general well-being of the patient than is desirable, unless, indeed, such remedies are deemed imperative.

So far as it is possible to judge, the average duration of an amygdalitis of ordinary severity ranges between five to seven days, during which a certain fever and malaise persist. On consulting the experiences of those favoring the antirrheumatic treatment but little abbreviation of the time limit is perceived, notwithstanding the earliest advantage of such remedies. The query is consequently a natural one, how far the remedy or how far the subject is to be valued in the instance where an attack apparently acute has aborted in intensity or duration. With especial reference to guaiac, it is difficult to understand by what sophistry a patient can be brought to acquiesce in the selection of the officinal current paste lozenge, crowding the mouth with a tenacious and offensive secretion that can neither be readily swallowed nor expelled. Surely some consideration is due the sufferer, while satisfying by methods less vigorous the uncompromising theory of which the following words of Lennox Browne afford the clearest and most concise evidence: "From the most careful examination, extending over a number of years, the author has come to the conclusion that the dartrous or arthritic diathesis invariably exists in those patients subject to acute tonsillitis."

Paper.

SOME REMARKS ON REMOVAL OF THE TONSILS.

By JOHN W. FARLOW, M. D.

WHAT I shall have to say will have reference to the choice and manner of operation, and no mention will be made of the indications for removing the tonsils. I have assumed that any adhesions between the tonsil and the pillars are to be broken up as much as possible preliminary to operation. Although careful search of medical literature does not show many instances of severe hæmorrhage following tonsillotomy, we must acknowledge that very many cases of troublesome bleeding occur which are never reported. I have to judge from my own personal experience, but I have been

told by about a dozen patients that they suffered from very copious bleeding at the removal of one or both tonsils, so that they were much weakened and their recovery considerably retarded. These were all adults and their cases were never reported. Favorable cases are more interesting to write, and are considered to add more to one's reputation than unfavorable ones, and human nature still likes to put the best foot forward. Let us consider first the removal of large projecting tonsils. In children adenoid disease usually co-exists and requires removal. If pharyngeal and faucial tonsils are to be removed at the same time under anæsthesia, I am in the habit of first removing the tonsils with the écraseur, and the bleeding is practically none. This is a great advantage, because the child is not weakened, there are no clots in the throat, and the more bloody adenoid operation can follow with greater security. It is true that there is sometimes but little blood lost when the guillotine is used in such cases, but in delicate children every drop of blood may be valuable. Another consideration is of importance. If large tonsils were found in large mouths only, the adjustment of the amygdalotome would be easier than it really is, but small mouths and narrow jaws are frequent accompaniments of very large tonsils, and it may be next to impossible to get a large enough instrument well into the mouth. In the écraseur the loop can be made of sufficient size to go over the largest tonsil without taking up any room at all. I have removed a great many tonsils in children and adults, and have tried various écraseurs and snares. The one that I show you

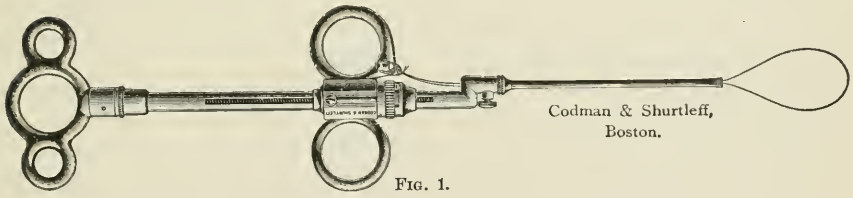


Fig. 1.

here (Fig. 1) I had made by Codman & Shurtleff, of Boston. I started with a Hooper écraseur as a basis, and have modified it by straightening it, so as to give a pull in a direct line. The cannula is flattened and widened at the end. I have lengthened the screw, so as to be long enough to cut through the largest tonsils, and I have strengthened the weak places. I have also changed the shape, direction, and position of the pins to hold the wire. I have been pleased with the result, and have succeeded in cutting off some very

large tonsils without any hæmorrhage. I haev used No. 5 or No. 7 piano wire, depending on the supposed toughness of the tonsils. Small soft wire bends too easily, does not retain its shape, and slips off the tonsil too easily. Probably No. 7 wire is the best for general use. The loop is made of the required size, bent to the shape of the tonsil, and pushed over it, the tonsil being pressed from outside with the finger, or pulled from the inside with forceps into the loop, and then drawn tight. The screw can then be set, and the turning of the crossbar at the end proceed as rapidly or slowly as is desired. In children I have usually cut through without delay, but in adults I have gone more slowly. Professor Moritz Schmidt, in his recent work *Krankheiten der oberen Luftwege*, page 229, recommends the use of the galvano-cautery snare in such cases. Lichtwitz, in *Archiv für Laryngol.*, zweiter Band, page 318, also expresses preference for the hot wire. But I do not see the advantage of heating the wire, with the possible risk of burning the neighboring parts, and having a wound longer in healing and more prone to inflammation, when, with a proper, strong écraseur and suitable wire, the tonsil base can be constricted and cut through *ad libitum* and, it seems to me, without risk of hæmorrhage. Dr. Clarence Rice has recommended the use of a dull guillotine in certain cases to obviate hæmorrhage; but the wire, which both divides and constricts and can be operated as slowly as desired, seems to me much more rational. Bosworth advocates the use of the écraseur in adults, but I have thought his instrument hard to thread, and the écraseur movement not so satisfactory to manipulate as the one I show you. Moreover, the cannula is at an angle, and the wire works at a disadvantage in not having a straight pull. Lenox Browne's écraseur I have never tried. Ingals recommends in children a polypus snare. I have not found this satisfactory, because it is often too weak and has not a long enough play for a large tonsil, and may have to be threaded a second time. I have thought that the large, firm tonsil required a very different instrument from the soft mucous polyp. I should say that, according to my experience, projecting tonsils in children under anæsthesia, where the adenoid operation was to follow, or in children where it was possible that there might be hæmorrhage, or where it was desired that there should be no hæmorrhage, were well and safely removed with a strong écraseur.

In children without anæsthesia, where no adenoid operation is to follow, the amygdalotome is quicker and probably safe enough, and preferable, except as I have indicated above, or where the tonsils

are so large in comparison with the mouth that the ring of the amygdalotome can not encircle the tonsil well. In adults, I agree with Bosworth and differ from Ingals in regarding the écraseur as a very valuable instrument to obviate the risk of hæmorrhage. Perhaps the fact that Bosworth uses a strong instrument especially adapted for the tonsils, while Ingals uses a polypus snare, as I have said, may account for their divergence of opinion. I have removed a great many large and tough tonsils in adults with the écraseur, and have never had more than the slightest flow of blood. I have the patient hold ice in the mouth, and I apply cocaine to the tonsil before operating. Ice is used freely afterward to diminish the tendency to swelling, which almost always occurs in adults after amygdalotomy. There are, of course, cases where the shape of the tonsil does not admit of a good adjustment of the wire loop, and where the guillotine is better suited. I have also used in such cases with considerable satisfaction the punch of Ruault to replace the tonsillotome. With it large pieces can be removed with ease, with but little pain, and slight hæmorrhage. Where the tonsil does not project beyond the pillars sufficiently to permit the use of the guillotine or écraseur I have been in the habit of using a punch, either that of Ruault or the smaller conchotome of Hartmann, with which the deeper seated masses, such as those high up near the junction of the pillars, can be thoroughly removed. This latter punch acts as a forceps to pull the tissue out from its bed, and also serves to cut it off. If the tonsil is very tough it does not always cut through easily. I have had another punch made with more powerful jaws and stronger leverage to remedy this defect (Fig. 2). Scissors may naturally be used to supplement the cutting. In order to open up the tonsil and give access to the deeper parts as well as to furnish surfaces for the punch to take hold of, I have used curved or other knives, such as those advocated by Dr. G. A. Leland. These are thrust from one crypt into another and the intervening tissue cut through. The punch then easily removes the loosely hanging fragments. In this way the diseased follicles and the deep seated hypertrophies are got rid of.

For a number of years I had used the galvano-cautery puncture very faithfully, but must confess that the tediousness of the process and the inflammation which sometimes followed were causes of great dissatisfaction. I have often been surprised to find how little reduction in size had followed quite a vigorous burning. With the punch I have had but little complaint of pain after using a five- or ten-per-

cent. solution of cocaine, and the bleeding has been very moderate. I get the patient to hold pieces of ice in the mouth, which serves to

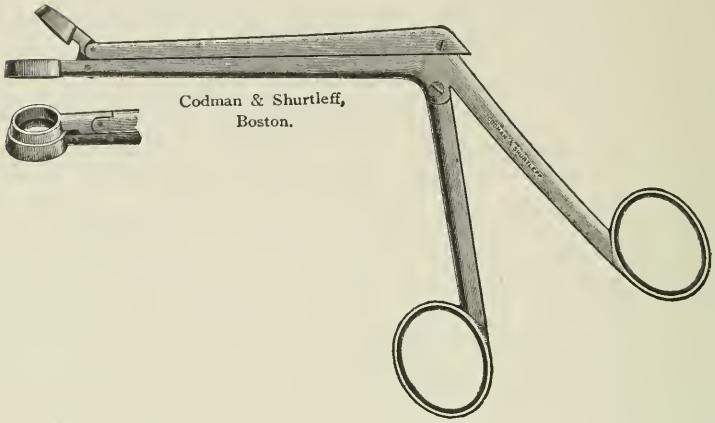


Fig. 2.

numb the throat and check the bleeding. I have often reduced the size of a tonsil in this way in two sittings as much, or more, than I could have done in four or five times as many *séances* with the cautery. In a paper which I have recently received from Dr. Bliss, of Philadelphia, he recommends the removal of pieces of the tonsil with scissors. It is necessary to seize the tonsil with forceps and then cut off the different pieces with scissors. The punch acts both as holder and cutter, and is able to cut at right angle to its long axis, making it much better adapted for being thrust in between the pillars. Dr. Yerwant, of Padua, in the *Archivio Italiano di otologia*, vol. i, 1894, p. 147, recommends a forceps not unlike the Weir side-cutting forceps for the nose. This seems to me not so good as a strong instrument that at its end cuts at right angles to its long axis. In patients who are bleeders, I should prefer the cautery; also where pieces adherent to the pillars are to be destroyed and in tonsils of moderate size with a few enlarged or diseased follicles.

After removal by guillotine or écraseur the punch can be used as a trimmer of ragged ends, parts which the other instruments have omitted, and to go deeper in between the pillars.

Paper.

A CASE OF POLYPOID LIPOMA OF THE LARYNX.

By JOHN W. FARLOW, M. D.

IN March, 1893, J. W., aged sixty-six years, consulted my colleague, Dr. W. F. Knowles, for a polypus of the throat. His health had always been good. He first noticed trouble in his throat about fifteen years before, and his family physician had removed a piece two inches long about two years before with straight scissors. On bending his head forward and downward and coughing, a polypoid growth appeared, the tip of which could be drawn at least half an inch beyond the lips. When I saw him he was holding the tumor, wrapped in a fold of his handkerchief, with the fingers of his right hand outside the right side of his mouth. The growth had several projections from it and reminded one of branching coral. It almost entirely occluded the orifice of the larynx and seemed to have attachment to the posterior pharyngeal wall just above the right arytænoid. When he let go of the tumor it fell back into the pharynx and one piece dropped down between the vocal cords into the subglottic and tracheal region. This piece was somewhat attenuated and constricted, probably by the action of the vocal cords.

For several months he had been much troubled by shortness of breath, which is very natural, considering how the larynx was filled up.

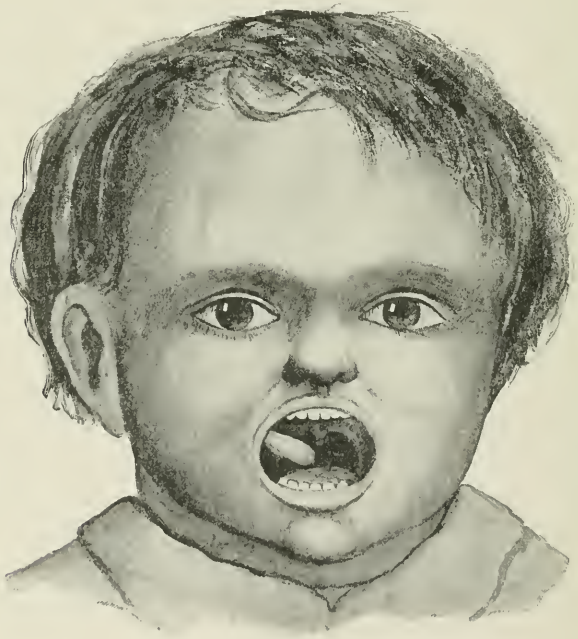
At the patient's first visit Dr. Knowles attempted the removal of the growth with a cold wire snare, but an accident to the snare forced him to use long, curved scissors to free the wire and he removed two large pieces. The patient's breathing was so much improved that he refused any further treatment until December, 1894, when he again appeared on account of a decided increase in the size of the growth. With the galvano-cautery snare Dr. Knowles removed the rest of the growth in three pieces. The attachment was found to be very low down in the pharynx. Three months later there had been no recurrence. Microscopic examination showed it to be a submucous polypoid lipoma. Dr. Farlow showed the specimens in alcohol and also a photograph, natural size, taken from the fresh specimens.

According to Bosworth, the development of fatty tumors of the larynx is confined, with the single exception of a case reported by Bruns, to cases which, taking their origin in the arytæno-epiglottic region, fall externally into the hyoid fossa, where they sometimes attain considerable size. In a case of Holt's, a man eighty years of age, a pedunculated tumor, which had existed for twelve years, extended into the œsophagus. He died from suffocation, the tumor

being expelled from the œsophagus and lodging on the entrance to the larynx. In a case reported by Jones the tumor was round and pedunculated and two inches in diameter. It was enucleated by the natural passages. In a case of Macleod's the tumor was as large as an orange. Lateral pharyngotomy was performed, and the patient died subsequently of hæmorrhage. In Bruns's case there was an intralaryngeal growth in a woman of twenty-five, which was thought to be congenital. It was large and occluded the larynx. The larger part was removed by the galvano-cautery in fifteen sittings.

Dr. Knowles expects to report the case *in extenso* with illustrations, and through his courtesy I am allowed to show you the specimens from a very uncommon case.

A Case of Polypoid Lipoma of the Inner Side of the Cheek (*John W. Farlow, M. D., Boston*).—A. B., aged two years, was brought to my clinic at the Boston City Hospital. He had always been well and presented



a healthy aspect. The previous day the mother had noticed blood in the mouth of the infant, but seems not to have been aware of any growth. On opening the mouth I saw a reddish, lobular body, having

its attachment by a narrow pedicle to the inner side of the right cheek just anterior to the opening of Stenson's duct. It was soft, freely movable, not fluctuating or ulcerated, and was a little more than an inch and an eighth in length and half an inch in diameter. It had a glandular look and seemed as if it might be a piece of the parotid gland. I cut it off with a wire snare without hæmorrhage. The bleeding which attracted the mother's attention was probably caused by the child's biting the tumor. Microscopic examination shows it to be a polypoid, submucous lipoma, made up almost entirely of fat cells.

I will not take up your time by quoting and describing similar cases recorded in literature, but merely state that they are very uncommon. When they grow into the mouth and become pedunculated they soon give rise to symptoms which lead to their early removal. When they grow outward into the cheek they may attain a large size and be mistaken for tumors of the parotid, which they much resemble. The accompanying figure gives an idea of the situation, shape, and size of the growth in my case.

A good account of the subject, with illustrative cases, can be found in an inaugural dissertation by Franz Knoche, published at Siegberg in 1888 and entitled *Ueber Lipome der Mundhöhle.*

Discussion.

Dr. J. W. Gleitsmann said that he had not had any difficulty in removing tonsils. In a few cases in adults, where he had feared hæmorrhage, he had used the galvano-cautery snare and the irido-platinum wire in connection with the instrument of Dr. Knight. He had found it acted admirably. There was sometimes difficulty in placing the loop over the tonsil. If the tonsil was very large and the amygdalotome was not sufficiently wide to remove it all at once, he always began at the lower end, because this portion was most liable to give rise to subsequent trouble, such as pharyngeal neuroses.

Dr. F. H. Bosworth, of New York, said that he thought if we abandoned entirely the idea that the tonsil was one of the organs of the body, and accepted the teaching that the tonsil was simply a mass of diseased tissue in the fauces, which presented definite clinical indications, the treatment would become quite simple. These clinical indications were to remove the diseased tissue. As regarded hæmorrhage, his own experience had taught him that if we cut into such a hypertrophy in adult life it was going to bleed, and hence he preferred the use of the cold snare. He had made use in his own work simply of an enlarged and strengthened polypus snare, but Dr. Farlow had constructed what was perhaps a better instrument. Guersant had stated that in five thousand amygdalotomies he had never seen severe hæmor-

rhage, but they had all been in children. The speaker said that neither had he seen severe hæmorrhage in children. The large, rounded, pear-shaped masses occurring in children from eight to twelve years of age, and which fitted so beautifully into the amygdalotome, could be readily removed by that instrument, but those which spread upward and buried themselves beneath the pillars of the fauces, or those cases in which the pillars of the fauces covered more or less of the tonslis, could not be so easily treated. In these latter cases the tonsils must be dug out. A stout steel-wire snare would accomplish this perhaps in the best way, although it would be necessary to remove the tonsil in several pieces. The indication was to remove all the lymphatic tissue. Each case, however, presented an independent problem for treatment.

Dr. Ingals said that there could not be much objection to the cautery or polypus snare for removal of the tonsils if the instrument was sufficiently long and powerful. Some years ago he had had the handles of these instruments made five inches long, which was ample for this purpose. The ordinary polypus snare was not strong enough for the removal of a firm tonsil in an adult, although it would answer well in children. He would like to know how long the reader of the paper required to remove a tonsil with his écraseur. A strong and rapidly cutting snare would certainly be very desirable. He, when removing a tonsil in this way, had had the misfortune of having the wire meet with a concretion, so that it became necessary to break and remove the wire, the patient suffering severely all the time. He was well aware of the danger from bleeding when the amygdalotome was used, for he had seen a number of trying instances of the kind. The bleeding had generally occurred in cases where the tonsils were so small as not to require removal at the time of the operation, but where the operation had become necessary because of frequent inflammation. He had not been able to anæsthetize the parts sufficiently with cocaine to relieve the pain, except for a very rapid operation. In removing the tonsils by the snare in children it was important to have a forceps with which they could be drawn out so that the snare could secure a firm hold. If the tonsil was adherent to the anterior pillar of the fauces, this must first be separated and then the tonsil drawn out sufficiently to permit the instrument to secure it completely.

Dr. Carl Seiler, of Philadelphia, said that the author had pointed out the fact that we had frequently to deal with a sort of fibrous degeneration of the inflammatory product of this abnormal deposit of lymphatic tissue which we called the tonsil. It was for these tonsils that a strong écraseur was needed. In children, where the tissue was still soft, consisting of nothing but lymphoid cells, the mass could be easily removed with the ordinary polypus snare. Regarding the use of Mathieu's guillotine in cases in which the tonsil was so large that it would not readily include the tonsil, he said that this objection to the

instrument was due to its faulty construction. It was a mechanical absurdity to make the opening of the instrument as it was ordinarily made. By simply turning the ring on its long axis it became an easy matter to introduce the instrument. A "*steel*" tube would be abundantly strong enough for any kind of steel wire, and hence if the écraseur were properly made of steel and not, as was often the case, of German silver, it would be sufficiently strong to withstand the strain upon it.

Dr. Mulhall said he merely wished to emphasize a point mentioned by Dr. Ingals, and one which was very generally neglected by the general profession—viz., the importance of separating the adhesions existing between the anterior pillars of the fauces and the tonsils. Mothers frequently asked if these tonsils would return after they had been cut out, and his reply was that they would not return if the tonsils were *properly* cut out. The trouble was that many operators neglected to separate these adhesions.

Dr. Daly said he was of the opinion that there had been more bad surgery done upon the tonsils than upon any other part of the human body. He had endeavored to study whatever might be the use or functions of the tonsils for many years, and he had come to the conclusion that they formed no part of the normal throat. He believed this opinion would become generally accepted by careful observers. All tonsils which projected beyond the pillars of the fauces should be removed. Such a tonsil served no good office in the economy, and its removal would add to the patient's comfort, well or ill. The method described in the paper was certainly an excellent one to employ in particular cases, as in "bleeders," but we were all more or less creatures of habit, and he had been in the habit for many years of using the Mackenzie amygdalotome. But with this instrument the operation was often not thoroughly done. It left an unsightly stump frequently, and he had used probe-pointed knives and forceps for rendering the stump of the tonsil smooth, and also dissecting out the ragged portions of the tonsil piecemeal after abscission with the Mackenzie amygdalotome, especially for freeing the tonsillar tissues from the half arches.

He wished to be placed on record as saying that the man who pinned his faith to the statement that there was no danger of hæmorrhage in amygdalotomy would sooner or later meet his Waterloo. Such an individual deserved to meet this fate for relying upon worthless statistics. Personally, he had had several cases of alarming hæmorrhage. In one of them the patient had nearly died, and he had found himself in a very awkward predicament to say the least. He had made an appointment to remove the tonsils from a farmer's son, but learned on his arrival that the boy was out on the farm. He went out and met the boy in the woods, and did the operation then and there. The result was that he had to spend several hours with his fingers in the patient's throat to arrest the hæmorrhage.

Dr. Casselberry said that he had had enough cases of serious hæmorrhage after amygdalotomy to make him cautious and somewhat anxious about every patient operated upon with the amygdalotome. And he was not sure that such hæmorrhages might not occur in children. He had not had any serious result of this kind in his own practice among children, but he had elsewhere reported a case of fatal hæmorrhage after amygdalotomy occurring in the practice of a friend by whom he had been told the details for the purpose of publication. The operation had been done on a child of three years in the ordinary manner with an amygdalotome. The bleeding had apparently stopped, and the physician had left the house, but had been hastily summoned several hours later, found on his arrival the child very much exsanguinated, and, in spite of efforts to stop the hæmorrhage, the child had died in a few hours. There was no history in this family of any member having been a "bleeder." Inasmuch as it was the most painless method of removing the tonsil, he was accustomed to use the amygdalotome, but he did not employ it unless he had the galvano-cautery apparatus at hand for the purpose of checking any serious hæmorrhage that might occur. He recalled a case in his office in which the blood had spurted from a vessel as large as a knitting-needle, in which, with the aid of an assistant and by rapid sponging, he had been able to see and cauterize the bleeding vessel. He did not like to use the amygdalotome for the large fibrous tonsils. In these cases he had generally employed the galvano-cautery snare, although on several occasions he had substituted the cold snare, as recommended by Bosworth and others. These patients had complained bitterly of the pain, and there had been considerable swelling afterward. He could not say that the swelling and soreness had been any less than where he had used the galvano-cautery snare. This snare should be skillfully applied, and care taken not to burn the muscular pillars of the fauces. With a specially constructed volsella he was accustomed to draw out the tonsil, no matter what plan of removal was adopted. The separation of the pillars from the tonsil had given him a great deal of trouble. Sometimes they were very adherent, and in children the dissection was almost impossible. When he had been sure that the muscular part was adherent, he had been particular to separate the adhesions, but if, as often happened, there was simply thickened mucous membrane reflected from the pillar over part of the tonsil, he had not felt called upon to carry out this dissection, but cut it through together with the tonsil.

Dr. Shurly said that he had had two very serious cases of tonsillar hæmorrhage occurring in children. It was important to first estimate the nature of the tissue composing the tonsil to be removed. With the "scirrhous" tonsil, it was well known, there was always danger of hæmorrhage. It was better, as a first step, to feel of the tonsil and ascertain whether it was soft or hard. If the tonsil was hard, there could be no question about removing it with an écraseur or the gal-

vano-cautery. He had only used the snare described by Dr. Farlow on two or three occasions, and had then found it a very tedious process, involving the prolonged use of an anæsthetic, for, if an anæsthetic was dispensed with, there would be a good deal of muscular excitement of the throat. In his experience, it had been sufficient to take away only enough of the projecting portion to relieve the mechanical obstruction and the pressure and irritation produced. He had never seen any serious hæmorrhage from the use of the guillotine, or from the volsella and knife, with the above-mentioned exceptions. He had learned by former mistakes not to puncture the crypts directly when using the galvano-cautery, but to make the punctures diagonal to these crypts. Very often only two sittings would be required for reducing even very large tonsils. The object of the treatment was to destroy the lymph spaces by substituting a local acute inflammation for an old and chronic one. The nutrition and absorption of the organ would be most favorably affected by making these punctures diagonal to the direction of the crypts. The puncture directly into the crypt only served to increase the obstruction by agglutination of its walls. In cases where there was elongation of the tonsil, the elongation was generally downward. In such cases he had used the snare preferably.

Dr. Daly said that a little instrument had been described to him for arresting hæmorrhage from the tonsil. It consisted of a pair of rings on a handle, with a spring, and was intended to make pressure on the throat laterally.

Dr. Newcomb said that an instrument on this same principle had been presented to the New York Academy of Medicine by Dr. Butts.

Dr. T. Morris Murray, of Washington, D. C., referred to a case where the patient had nearly bled to death, and in which the hæmorrhage had been promptly arrested by pressure made with the instrument devised by Professor Störk for arresting hæmorrhage in such cases.

Dr. Coolidge said that the pain produced was the principal objection to the cold snare. This instrument removed the tonsil more satisfactorily than the tonsillotome and, of course, produced less hæmorrhage, but the pain, both during the operation and afterward, was much greater.

Dr. Farlow said that serious, even if not alarming, hæmorrhage sometimes occurred in children after amygdalotomy. He had seen children with enormous tonsils which could not be removed by the ordinary polypus snare, which was certainly too weak for that kind of work. An important advantage of the écraseur was that the loop could be made of the size and shape of the tonsil, and in cutting through it constricted nearer the base of the tonsil than the amygdalotome did, so that less was left behind. He referred to specimens which he had that showed entire removal of tonsillar tissue. There was certainly more pain than with the amygdalotome, but the hæmorrhage had been practically nothing.

Paper.

A CASE OF MELANCHOLIA DEPENDENT UPON ETHMOID DISEASE AND CURED BY INTRANASAL OPERATION.

By F. H. BOSWORTH, M. D.

I REPORT the following case, not so much in order to put on record a new disease cured by intranasal operation, but rather as illustrating and emphasizing the fact that cerebral and psychic disturbances may be the direct result of ethmoid disease, and also to put on record a story which to me is filled with no little pathos when we consider how completely life had become a burden to the patient, and to what extremes he resorted in his earnest and self-sacrificing struggle to regain his health. The history is as follows:

M. M. T., aged forty-two years, merchant, consulted me on April 17, 1891, with the following history: In 1876 he had an attack of severe influenza which developed into well-marked hay fever, his attacks coming on in August and lasting till frost. He also had some mild symptoms in the spring months. In 1881 he commenced to suffer from depression of spirits and sleeplessness, and soon fell into a sort of melancholia, which at first was somewhat periodical in character, but in later years had become almost constant. So profound was his melancholia that he was utterly unfitted for business, although perfectly conscious of his condition and exceedingly anxious and ready to resort to any possible method of gaining relief. As he described it himself, "Just before I succumbed to this nervous trouble, when I retired at night, my eyeballs seemed too large for their sockets. I remember having had on several nights a feeling of pressure, a twisted or tied-up feeling between the eyes, which seemed to hold my mind riveted to the unpleasant subjects which it was contemplating." Upon the advice of his family physician he went to Bermuda, but without avail. He then seems to have made the round of a large number of physicians, both in New York and Brooklyn. One advised him to go to work and make his hours as long as possible. Another advised him to place himself in the Middletown Asylum, which he promptly did, remaining a fortnight. Another advised him to work at gardening, which work he followed industriously for a while, but with no relief. Another sent him to the Adirondacks for the summer. Another put him on a course of electricity, which he followed for several months but received no help. He was then put on the Salisbury diet, but received no benefit. Being now convinced that medical advice was of no avail, he determined to try of what avail surgery would be, and was operated upon for varicocele by a distinguished homœopathic surgeon of this city, but

his melancholia persisted. He then had the Baunscheidt used daily for three months along the spine, also in the left iliac region, without result.

His next effort consisted in having eyeglasses fitted for some possible error in refraction. This failing, he submitted to an operation for stricture, and, deriving no advantage, determined to have performed the operation of castration, which was successfully done on perfectly healthy organs. His melancholia persisted and, if anything, deepened, and now circumcision was performed. Having undergone this sacred rite without any improvement in his condition, the next resort consisted in the ligation of the pudic artery. His sufferings were as great as ever, and another system was invaded and hæmorrhoids were operated upon, and still his melancholia persisted. His spine was now cauterized unavailingly, and next a seton was inserted in the back of his neck and worn for a month. This measure was no more successful than the former.

He now returned to the oculist and had the muscles of his eyeball operated upon. This failing, a still more radical operation was determined upon, and a healthy eyeball was enucleated. In spite of all these measures the symptoms not only failed to improve, but his melancholia deepened, and life became so burdensome to him that he seriously contemplated suicide. Knowing the man as I subsequently grew to know him, I am convinced that suicide would have been the result had he not been a man of considerable force of character, with a full appreciation of the seriousness of his condition, and with too much manhood to resort to an act which he could only regard as cowardly and craven, although, as he has since expressed it to me, one of his principal hopes in submitting himself to these numerous operations was that in some of them he might succumb by the hand of the surgeon rather than by his own act. After this ten years of hopeless and pathetic search for health, during which he consulted a large number of physicians (and among them, if I were to repeat them, you would recognize some of the most prominent men of the profession), he was finally advised to consult a nose and throat specialist, and called upon me on the advice of Dr. Mattheson, of Brooklyn.

I found him in fairly good physical condition; fair in his statements to me; apparently perfectly frank in every respect as he recounted his previous history, yet evidently in a condition of profound mental depression. I examined his nasal passages and found almost complete occlusion of the right nasal cavity by an angular deflection of the left sæptum, while in the left side the middle turbinated body was markedly swollen, projecting into the hollow made by the deflected sæptum and covered by myxomatous tissue, showing distinctly the existence of ethmoid disease. I removed the projecting portion of the sæptum with a saw and subsequently snared off the projecting portion of the middle turbinated bone, thus opening up the ethmoid cells.

These operations were followed by prompt and immediate benefit. In fact, he left my office with that peculiar sense of relief which is so common in these cases of ethmoid disease, although I should say here, of course, that I refer only to the aprosexia, not to the psychical symptoms, for nothing in my previous experience had led me to hope that such relief was to be expected, and yet, on his second visit to me, he reported great improvement in his mental and moral condition, and this continued so rapidly that three days after my first operation he resumed business, and is now at the head of a large concern which requires constant attention and acute business tact and judgment. As he tells me, he considers himself a better business man than ever, notwithstanding the long years of profound melancholia in which he lived and the various operations to which he was subjected. I ought to mention, perhaps, that his hay fever is also practically cured, substantiating the point that hay fever and allied affections are in many instances, probably, to be regarded as the direct result of ethmoid trouble rather than reflex in character.

That the melancholia in this case was directly due to his ethmoid disease I think can not be questioned, and, furthermore, that it was due to some organic change at the base of the brain I fully believe. We thus do away with the obscure question of reflex or functional disturbances, and accept an explanation of these cases which is quite simple and easily understood. An inflammatory process in the ethmoid cells, with its accompanying intracellular pressure, is separated from the brain but by a very thin plate of bone. Hence, that circulatory or other disturbances within the cranium are liable to occur is not surprising. That they do, and that much oftener than we are usually taught to suppose, I fully believe, and the case reported above furnishes contributory evidence.

Paper.

A CASE OF SUPPURATIVE ETHMOID DISEASE FOLLOWED BY INVASION OF THE SPHENOIDAL SINUS, ABSCESS OF THE BRAIN, AND DEATH.

By F. H. BOSWORTH, M. D.

I WAS called on January 31, 1895, to see, in consultation with Dr. E. S. Warner, Dr. B., dentist, aged thirty-three, who gave the following history:

He had had for a number of years a purulent discharge from the left nostril which in the last few months had also extended to the right

side. This had been a source of not much distress to him other than the offensive discharge and occasional headaches. On the 27th of January he was seized with a most intense and excruciating headache, which seemed to be neuralgic in character, and was confined largely to the left side of the head and face. His suffering was at times of a most agonizing character, and confined him to his room and to his bed. There was no psychical disturbance, no photophobia, or any suggestion of brain trouble. There was no fever. The pain was almost constant in character, and rendered sleep impossible, although large doses of anodynes were given.

When I saw him he had been suffering for four days. I found the man in the prime of life and of superb physique. An examination revealed large quantities of inspissated pus in the left nasal cavity and some on the right. I cleared out the left passage with cotton and probe, and found the middle turbinated bone somewhat swollen and pus oozing from between it and the sæptum. On passing the probe into the ethmoid cells I found the cell walls soft and crumbling, indicating necrosis, and was convinced that I had to deal with a case of suppurating ethmoid disease of long standing, and that the symptoms of the past few days indicated an invasion of the sphenoidal sinus, and, furthermore, that the only hope of relief was in thoroughly opening up the posterior ethmoid cells and, if possible, to extend my opening into the sphenoidal sinus. This I immediately attempted by means of a sharp-pointed gouge. This gave notable relief for the time, but on the 7th of February I was called to see the case again, and found that the relief had only been of a day or so's duration, and that his distressing symptoms had all returned. I then made use of a burr, three sixteenths of an inch in diameter, operated by the Devillbiss engine. This gave but little relief at the time, and on seeing him the next day I found that he had been seized on the morning of the 8th of February with a profound chill, followed by febrile movement, the thermometer indicating a temperature of 106°. He was in a semi-conscious condition and not easily roused, and partial paralysis of the left side of the face and arm had set in. During the day he had two other rigors at intervals of six hours, and died twenty-four hours after his first chill, the temperature before death declining to 103°.

There was no autopsy made, and yet I think there can be little question that the cause of his death was abscess at the base of the brain, caused by suppurating disease of the sphenoidal sinus, and that this was the result of a neglected suppurating ethmoiditis, the brain abscess lasting twenty-four hours, the sphenoidal disease thirteen days, and the ethmoid disease having been a matter of years. There are two points only which I desire to make in connection with this case, which I regard as both instructive and important,

and these are: first, that while we do not practically regard ethmoid disease as dangerous to life, yet the possibility of an invasion of the sphenoidal sinuses is something always to be considered in giving advice in these cases; and, second, whereas the literature of the last four years has contained reports of a large number of cases of sphenoidal disease, I am led to think, in reading the detailed histories of many of these cases, that possibly some of them were cases of ethmoid disease reported as sphenoidal. My own records show reports of one hundred and fifty cases or more of ethmoid diseases which, as a rule, have yielded more or less satisfactorily to treatment, and have shown no dangerous tendencies, with this one exception. I have seen in all my experience but two cases of sphenoidal disease, and both terminated fatally.

Paper.

A FURTHER CONTRIBUTION TO THE STUDY OF SUPPURATIVE DISEASE OF THE ACCESSORY SINUSES, WITH REPORT OF CASES.

By J. H. BRYAN, M.D.

WHILE a great deal has been written on the subject of suppurative inflammation of the accessory sinuses of the nose within the past few years, it is a subject that can hardly be said to be exhausted. It is one of great importance, and is equally interesting to the ophthalmologist as to the rhinologist, and I trust not without interest to the general practitioner. I hope to demonstrate in this communication not only the serious nature of these affections, but also to point out the frequency with which they are overlooked; for, in spite of the advances that have been made in the study of diseases of the nose and its neighboring sinuses within recent years, we still find abscesses that have existed in these cavities for a long period and have been treated for neuralgia.

I have selected a few typical cases from my case book which show the various phases of abscesses affecting these sinuses.

Case I. *Abscess of the Right Maxillary Sinus resulting from Dental Caries.*—This patient, a man, thirty-nine years of age, stated when he consulted me that he had suffered from nasal catarrh for a number of years, the secretions being greater from the right than from the left nostril. He complained of frequent attacks of neuralgia, the pain being referred to the supraorbital and infraorbital regions rather than to the

side of the face. His general health during the past year has been greatly impaired, having lost in weight, and complained of morning nausea, loss of appetite, foul breath, and difficulty in concentrating his attention on his work—that of a bookkeeper in a banking house.

When first seen by me he was emaciated, tongue furred, and complexion yellow. There was no swelling of the face, but there was some tenderness on pressure over the right canine fossa. He attributed his condition to nervous dyspepsia, and was under treatment for that affection when he came under my observation. A rhinoscopic examination showed a slight hypertrophy of the inferior turbinated bodies, but no secretion was observed in either nasal chamber. On blowing the nose, however, there was a slight discharge of foul-smelling pus from the right nostril. The upper first and second molar teeth of the right side were carious. He was referred to his dentist for their removal, and when he returned he brought with him the first molar, with a portion of a needle projecting about an eighth of an inch beyond the apex of one of its roots which had penetrated the floor of the antrum. He then recalled that about eight years previously he had picked the tooth with a needle which had broken off in the cavity. As it gave him no further trouble the incident was forgotten.

The treatment consisted in washing out the sinus with hydrogen dioxide and a saturated solution of boric acid through the opening left by the extraction of the first molar. In the course of three weeks pus had ceased to form and the alveolar opening was allowed to close.

The interesting feature of this case is the marked depression of the general health which was due to the swallowing and possibly slow absorption of the purulent secretions which had been going on for some time. Almost immediately after the removal of this source of irritation the dyspeptic and other nervous symptoms disappeared, and he soon regained his normal health.

Case II. *Suppurating Ethmoiditis terminating in Caries of the Anterior Ethmoid Cells.*—Mr. C., sixty-eight years of age, consulted me December 4, 1894, stating that for ten years he had suffered with neuralgia, the pain starting at the inner angle of the left orbit, radiating over the corresponding side of the face and head, and was increased in intensity by an acute head cold. For a number of years he had a slight yellow secretion coming from the left nostril, but was not aware that it was accompanied by a bad odor. There was no swelling at the inner angle of the orbit and no disturbance of the vision.

Rhinoscopic examination showed the left middle turbinated body slightly enlarged, and a thin, purulent secretion was observed coming both from above and beneath it in the middle meatus. The mucous membrane was so much swollen as to block up the upper part of the nasal chamber and prevent a thorough inspection of this cavity. On the

introduction of the probe into the middle meatus, caries of the anterior ethmoid cells was readily detected.

The ethmoid cells were opened by means of a sharp curette introduced into the middle meatus and all diseased bone removed under cocaine anæsthesia. It required a number of operations to accomplish this, and great caution had to be exercised in order not to injure the orbit, as the nose in this part was exceedingly narrow. At the last examination there was no pus present and apparently all diseased bone had been removed. The patient was entirely relieved of the pain referred to in the orbital region.

Case III. *Abscess of the Left Frontal Sinus resulting from Nasal Polypi and Hypertrophic Rhinitis.*—The case was that of a man fifty years of age, who stated that he had been afflicted with nasal catarrh for a number of years, the secretions coming principally from the left side. He has had intense headaches, the pain being referred to the left forehead. For the past year he had not been able to breathe freely through the left nostril, and he believes his general health has been greatly impaired by his nasal trouble.

When he consulted me on April 1, 1895, he had just recovered from a severe attack of influenza, which had greatly increased his painful symptoms. The headaches were intense and were accompanied by marked mental depression, and greatly increased by any mental effort. The secretions were profuse and muco-purulent in character.

On examination the supraorbital ridges were observed to be very prominent, and the integument overlying the left frontal sinus was somewhat swollen and red, the blush extending down on the corresponding upper eyelid. There was pain on pressure both above and below the supraorbital ridge, and slight pitting of the skin on pressure over the sinus. Rhinoscopic examination showed slight hypertrophy of the right inferior turbinated body, with little or no secretion in this nostril. The left nasal chamber was found blocked up with numerous polypi springing from the middle turbinated body, and there was a marked hypertrophy of the inferior turbinate, which had become adherent to a small bony spine springing from the sæptum. The secretions could be blown from the nose, but a large quantity was observed passing out through the post-nasal space.

The treatment consisted in simply removing the polypi and the bony spine and reducing the hypertrophy of the inferior turbinate. This was sufficient to establish free drainage between the frontal sinus and the nose, which were found to communicate by an unusually large fronto-nasal duct. The secretions passed into the nose after all obstruction had been removed. With the rapid subsidence of the inflammation the patient has been relieved of all his distressing symptoms. There is still a slight secretion of mucus coming from the sinus, but this is also rapidly diminishing in quantity. This case is still under observation.

Case IV.—*Abscess of the Frontal, Ethmoidal, and Maxillary Sinuses,*

with Caries of the Fronto-ethmoidal Cells.—Mrs. —, aged forty-eight years, a native of Santa Cruz, West Indies, consulted me May 10, 1894, giving the following history: For the past twenty years she has been subject to frequent catarrhal inflammation of the upper respiratory tract. She has given birth to ten living children, eight of whom are alive and healthy, and she has had fourteen miscarriages.

She did not consider her condition a serious one until about seven months ago, when she noticed for the first time a thick, yellowish discharge from the left nostril. This secretion increased in quantity and was accompanied by a bad odor. She has had constant nausea and a bad taste in the mouth for several months. There has been no pain in the teeth, which are absolutely sound. She has noticed, however, that the upper teeth of the left side project farther than those of the corresponding side, which is especially noticeable on closing the jaws. Her condition has been growing steadily worse, and about three months before coming to Washington the occasional headaches gave way to constant painful sensations over the whole of the left side of the face, but especially severe over the supraorbital ridge. At times the pain was almost unbearable. Examination showed a congestion of the whole of the left side of the face with a slight swelling of the corresponding supraorbital and infraorbital regions, and a superficial injection of the conjunctiva of the left eye. Severe pain on pressure over the supraorbital ridge and canine fossa. There was some pitting on gentle pressure over the affected sinus. The teeth were unusually large and sound, with some recession of the gums, leaving a well-defined separation between the gums and the enamel. Rhinoscopic examination revealed a slight turgescence of the inferior turbinated body of the right side. On the left side both inferior and middle turbinated bodies were deeply congested and swollen, and the nose was filled with pus, which passed freely both from the front and into the post-nasal space when in the reclining posture.

Upon the use of the electric light the left frontal and maxillary sinuses were observed to be opaque, while the corresponding cavities of the opposite side were translucent. The examination of the eye made by Dr. W. H. Wilmer revealed a narrowing of the visual field for red and green colors, while the field for white remained normal.

The diagnosis of abscess of the maxillary and frontal sinuses having been made, on June 1st, after the extraction of the first molar tooth, I trephined through the alveolar process at this point; pus followed the withdrawal of the instrument, and about a teaspoonful of yellow gelatinous mucus, which is characteristic of inflammations of this cavity, was washed out with a warm saturated solution of boric acid. The sinus was washed out daily with hydrogen dioxide and a boric-acid solution. In the course of two weeks the secretion of pus within this cavity had apparently ceased, but large quantities of pus were still observed in the middle meatus, and the severe headaches continued.

With the subsidence of the inflammation within the maxillary sinus and upon the use of detergent and antiseptic lotions within the nose, the swelling of the turbinated bodies subsided to such an extent that ethmoid disease was excluded from the case. No diseased bone could be detected with the probe, and all attempts at sounding the fronto-nasal duct were futile.

June 18th.—The patient was sent to the Garfield Hospital and the frontal sinus opened in the following manner: After observing the customary aseptic precautions, the integument covering the supraorbital ridge was drawn up so that the line of incision would be just under the ridge when it returned to its natural position. The incision was then made through the skin down to the bone, beginning just within the supraorbital notch and terminating on the nose. After elevating the periosteum, an opening into the sinus about one centimetre and a half in diameter was made with a chisel at a point about midway between the supraorbital notch and the nasal boss. Something less than a teaspoonful of dark green and fœtid pus was washed out of the cavity. As the solutions seemed to pass freely from the sinus into the nose, it was not thought necessary to pass a drainage-tube from this cavity into the nose. The sinus was thoroughly explored with a probe, but no exposed bone could be detected, and the frontal sæptum was found intact. A drainage-tube was inserted into the outer opening and the wound closed. The cavity was washed out daily with hydrogen dioxide and a saturated solution of boric acid for a month. When the secretion of pus had apparently ceased, the drainage-tube was withdrawn and the opening allowed to close. I was about to discharge the patient cured, when she returned to the office one morning with pus discharging into the nose and through the fistulous opening in the forehead, with all of the former painful symptoms returned. She was sent back to the hospital on July 29th and the sinus reopened. Granulations were found around the margins of the opening in the bone and also at the inner and most dependent part of the sinus. These were scraped away with a sharp curette and the opening enlarged with the chisel. The cavity was again thoroughly explored with the probe for diseased bone or any other cause of the recurrence of the inflammation, but nothing could be detected. As the solutions passed freely through the fronto-nasal duct I did not even now feel justified in passing a drainage-tube from the sinus into the nose. The sinus was washed out with a solution of bichloride of mercury (1 to 6,000) and packed with iodoform gauze. This form of treatment was continued for two weeks, when, owing to a tendency of the external wound to close, the gauze dressing had to be discontinued and simple irrigations of the cavity with antiseptic solutions resorted to. Such antiseptics as the bichloride of mercury, tricresol, iodoform, and pyoctanin had no effect whatever on the secretions of pus, which continued to form in increasing quantities. In the mean time, pus was discovered again in

the antrum, and during the irrigation of this cavity one morning I noticed that solutions injected into it found their way out through the frontal sinus opening, showing there was a direct passage between the two sinuses, thus accounting for the accumulation of pus in the antrum, amounting sometimes to as much as an ounce. As the stronger antiseptics seemed to irritate the mucous membrane of the sinus and the nose, I returned to the use of hydrogen dioxide and boric acid. The wound had now closed to such an extent that a small silver drainage-tube was passed into the sinus through which the pus found a ready exit.

October 21st.—On irrigating the frontal sinus the solutions were observed for the first time to pass through both nostrils, showing that the sæptum had become perforated. Owing to the possibility of there being a specific element in the case, the patient was given five drops of a saturated solution of the iodide of potassium three times a day, which was later increased to thirty drops three times a day without any benefit being observed.

November 16th.—The disease has evidently been a progressive one, for upon passing the probe into the middle meatus diseased bone was detected for the first time about the anterior ethmoid cells. The anterior half of the middle turbinated body was now removed with the electric burr in order to facilitate freer drainage and to render more accessible the anterior ethmoid cells, which were broken down and scraped away with a sharp curette. This, of course, was not done at one operation, but only after a number of sittings, and working from before backward until all carious bone was removed. From this time on the patient made progress toward recovery. The drainage-tube in the frontal sinus opening was removed February 1st, when it was evident that all secretion of pus had ceased. As soon as the metallic drainage-tube was removed the opening closed and the resulting scar was scarcely perceptible. As a precautionary measure a gold drainage-tube was introduced into the opening in the alveolar process, which she continues to wear in order to admit of free drainage of that cavity in case the secretions should be started again as the result of a cold. She was discharged cured March 1st, having been under observation for ten months. I have recently seen this patient, about two months and a half after she was discharged, and I am glad to report the sinuses were free from secretion, and the patient is comfortable and enjoying good health again.

Owing to the position of the accessory cavities, they are especially prone to inflammation, which may extend into them either from the nose or from the teeth when diseased, as in the case of the maxillary sinus. During the several epidemics of influenza that have prevailed here, I have met with a large number of cases in which the inflam-

mation had extended into one or more of these sinuses and complicated the simple nasal affection to a very painful and serious degree. Aside from the true influenza, the inflammation of a simple rhinitis frequently extends into one or more of these cavities, and unless recognized and treated early is most likely to result in an abscess. It is very important that these cases should be recognized and treated early, for upon their early recognition depends their final issue, which in many cases has resulted in the death of the patient.

In previous communications on this subject I have devoted some attention to the suppurative inflammation of the maxillary sinus. In this paper I will limit my remarks as much as possible to the suppurative inflammation of the frontal and ethmoidal sinuses.

Aside from acute inflammations extending into these cavities, their secretions being retained and finally resulting in suppuration of their lining membrane, there are other and more frequent causes—viz., chronic catarrhal rhinitis, hypertrophic rhinitis, polypi, foreign bodies blocking up the middle meatus so that the secretions are retained within the sinuses, and finally giving way to the formation of pus.

In well-marked cases the diagnosis of abscess of the ethmoid cells is not a difficult matter; but in many instances the symptoms are obscure, and there is frequently an implication of one or more of the neighboring cavities, so that it is almost impossible at times to tell which is the source of the pus. Then we can arrive at a diagnosis only by exclusion.

Among the earlier symptoms of abscess of the ethmoid cells may be mentioned pain, neuralgic in character, referring to the bridge of the nose, increasing in intensity with the progress of the disease, and extending outwardly along the infraorbital ridge, and occasionally along the supraorbital ridge, as was observed in Case II. With a distention of the cells there is a sense of pain and pressure felt in the orbit, exophthalmia, a narrowing of the field of vision, and if there is softening of the bone at the inner angle of the orbit crepitation may be present. On rhinoscopic examination, if the abscess is of the open variety, pus will always be found in the middle meatus, and if the posterior cells are involved it will occasionally be found passing into the post-nasal space. The middle turbinated body may or may not be enlarged; this depends on whether it communicates directly with the ethmoid cells.

In Case II this body was only moderately enlarged, while in Case IV it was about normal in size. The probe will in the ma-

jority of instances reveal carious bone when passed into the middle meatus and upward beneath the middle turbinated body.

While occasionally an abscess may exist in the frontal sinus without giving rise to any symptoms except a slight discharge of pus from the nose, as in the case reported by Luc (1), in the majority of cases the symptoms are very pronounced, and vary in intensity according to whether the fronto-nasal duct is open or closed. Pain in the frontal region, at first dull and then becoming lancinating in character as the secretions distend the cavities, is the most common symptom; there is pain on pressure over and under the supra-orbital ridge; there may also be some redness and swelling of the skin over the affected sinus, which sometimes extend down and involve the corresponding upper eyelid. If the fronto-nasal duct is open, there will be a discharge of pus from that side of the nose, and upon rhinoscopic examination pus will be found in the middle meatus, just under the anterior extremity of the middle turbinated body. This is the variety of the disease that the laryngologist most frequently meets with. If, however, the duct should be closed, then there is a dilatation of the sinus, with a tendency to bulge at its thinnest part at the inner angle of the orbit on a level with the root of the nose, and it occasions a displacement of the eye forward, downward, and outward. If there is no relief, the pus finds its way through this swelling into the orbit in the form of an orbital abscess, or ruptures posteriorly into the cranial cavity. Besides the possibility of an orbital abscess forming, among the other eye complications may be mentioned changes in the corresponding papilla, generally a hyperæmia associated with dilated and tortuous veins and a narrowing of the field of vision.

Occasionally abscess of the frontal sinus is complicated with an abscess in the ethmoidal and maxillary sinuses, as was shown in Case IV. In this case the inflammation affected the deeper cells, or the fronto-ethmoidal cells, which are well illustrated in Fig. 1.

These cells are in close proximity to the frontal sinus, and in all cases of obstinate or prolonged suppuration in this cavity they are involved in the suppurative process. In Case IV they were undoubtedly involved, which fact would account for the recurrence of the inflammation in the frontal sinus after it had apparently ceased secreting pus. It was not until the disease advanced and the superficial cells became involved that ethmoid disease could be fully established.

Another interesting feature of this case is that after the inflam-

mation of the maxillary sinus had been relieved, pus was found in this cavity coming from the frontal sinus, as is plainly evident from

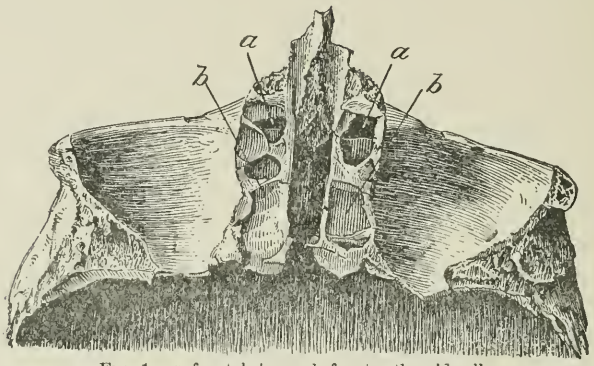


FIG. 1.—*a*, frontal sinus ; *b*, fronto-ethmoid cells.

the fact that solutions injected into the antrum found their way out through the opening in the supraorbital ridge. This unusual condition can be explained in two ways: either there was a natural communication between the frontal and maxillary sinuses—an anomalous condition that I have previously called attention to, and which is shown in Fig. 2—or it was pathological, resulting from caries of the anterior ethmoid cells. The latter I believe to have been the case. This anomaly has been noticed also by others. The late Professor Leidy said that he had met with it two or three times, and MacDonald (2) states that Dr. Curnow, professor of anatomy in Kings College, has also met with the same condition.

Fig. 2 shows the inner wall of the maxillary sinus, in which only two of the three openings into the middle meatus are visible.

The anterior or third opening, which is not shown in this view, is normal in position, but it communicates with a deep groove just in advance of the hiatus semilunaris which leads into the frontal sinus. By means of this groove it is possible to pass a probe from the cavity of the antrum directly into the frontal sinus, although, in so doing, it is made to enter the middle meatus first. The natural channel for pus or fluid coming from the frontal sinus would be into the antrum, in preference to the middle meatus. How often this anomalous condition occurs we do not know, but in all these cases of antral trouble which have apparently responded to treatment, but in which pus continues to accumulate, it is well to bear in mind the possibility of its coming from one of the sinuses

situated above through a false or natural passage, as shown in the above figure.

In simple uncomplicated cases of suppurating ethmoiditis, after removing the cap of the middle turbinated body either with the snare or the electric burr, I prefer to continue the opening of the individual cells with a sharp curette, an instrument I consider

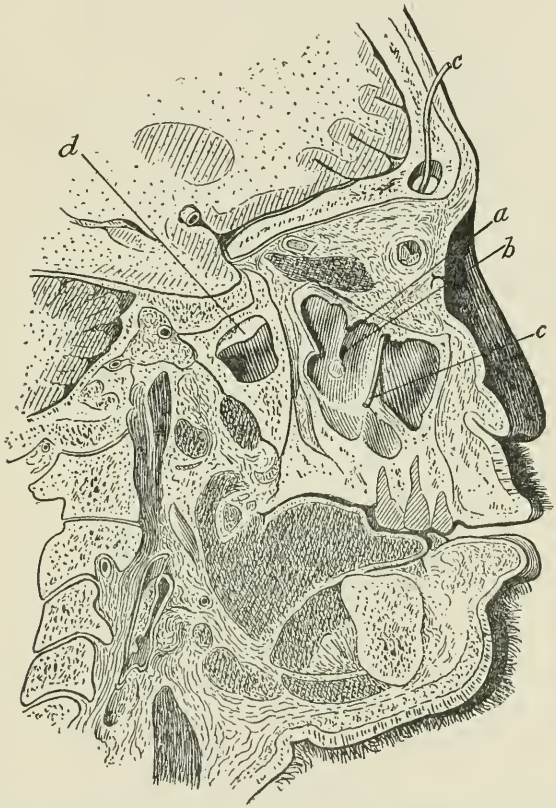


FIG. 2.—*a*, *b*, openings into the middle meatus; *c*, *c*, a probe passed from the frontal sinus into the antrum; *d*, sphenoidal sinus.

safer than the electric burr, for it must be borne in mind that this is a dangerous region, and if there is any undue amount of roughness used, or if the instrument should slip, there is the possibility of penetrating the orbit or the cranial cavity.

Fig. 3 shows very well the ethmoid cells with their thin bony

trabeculæ, and also their relation to the frontal and sphenoidal sinuses.

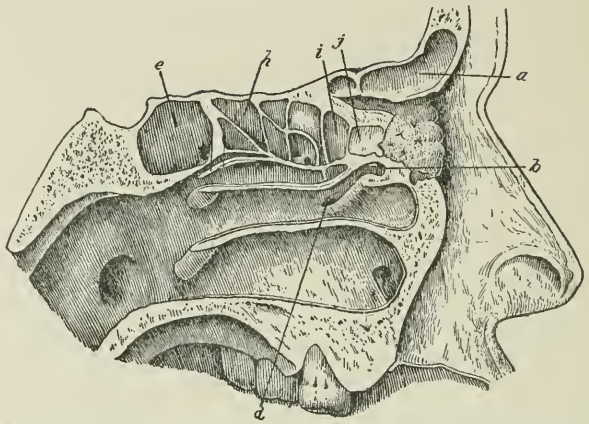


Fig. 3.—An antero-posterior section through the ethmoid cells, showing their relation the frontal and sphenoidal sinuses. (Gouguenheim and Glover.)

Fig. 4—a cross-section of a skull showing a sectional view of the ethmoid cells and their relation to the orbital cavities—demonstrates the narrow space between the nasal wall of the ethmoidal sinus and the orbit.

In case the deeper or fronto-ethmoidal cells are involved then we should not attempt to relieve them through the nose, although it was done successfully in Case IV, as the operation is not unattended with danger, but the case should be treated as one of frontal sinus abscess, of which this condition is a very frequent complication. The same object is to be sought in the treatment of abscesses of the frontal sinuses as in the other neighboring cavities of the nose—that is, to evacuate the pus and establish free drainage. In a few cases this can be accomplished, as in Case III, by removing any hypertrophy, polypi, or anything within the nose that serves to obstruct the fronto-nasal duct, when, if this duct is pervious, free drainage can be maintained, and the inflammation of the lining membrane, if not having existed too long, may subside and the patient eventually fully recover. If, however, the duct should be blocked, then an attempt should be made to pass a probe into it so that its permeability can be re-established. Sounding the fronto-nasal duct is by no means an easy procedure, and when possible it is more applicable in cases of mucocele than in cases

of suppurative inflammation, and it prevents the former painful condition from being converted into the much more serious affection of abscess of the frontal sinus.

Fig. 4.—Cross section of a skull, showing a sectional view of the ethmoid cells and their relation to the orbital cavities and the middle turbinated bodies.

In the majority of cases of abscess of this sinus, if of long standing, it will be found necessary to make an artificial opening. The incision, after gently drawing the skin on the forehead, should be made along the lower border of the supraorbital ridge down to the bone, commencing just within the supraorbital notch and terminating on the nose; generally this form of incision will be sufficient, but in those cases where there is well-defined necrosis of the outer table of the bone, then the method of Panas (3) should be adopted—that is, of making another incision perpendicular to that along the supraorbital ridge, and the triangular flap thus formed is detached from

the bone together with the periosteum, and the sinus perforated near the inner angle of the orbit. The opening should be sufficiently large to admit of a thorough exploration of the sinus with the finger and probe. Any osteophites or granulations must be removed with

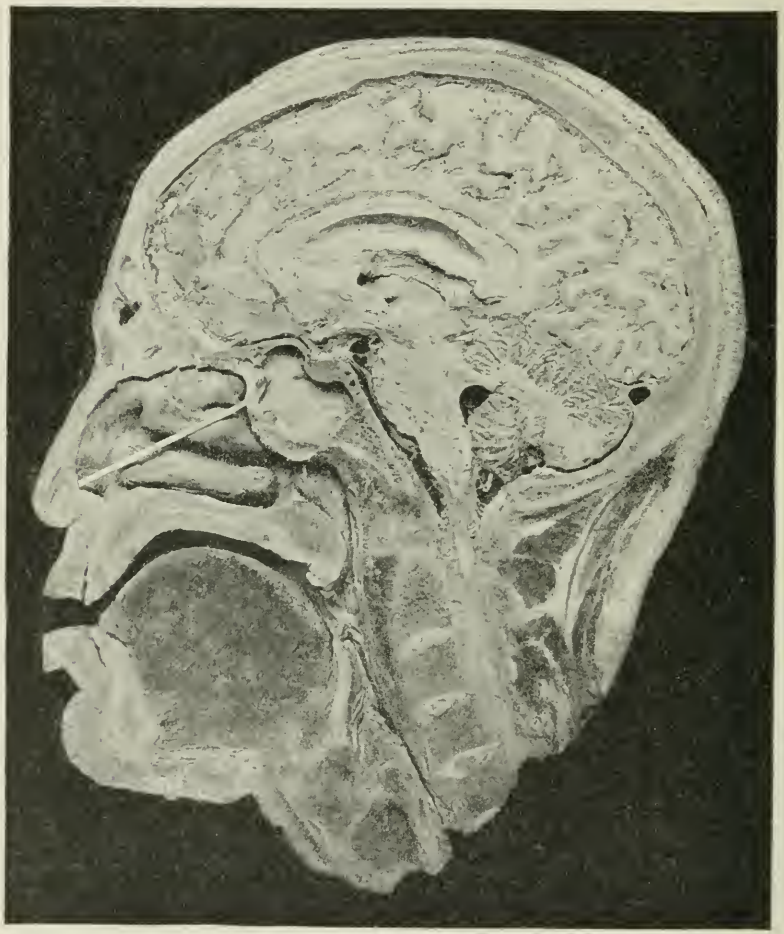


FIG. 5.—A sectional view of a skull, showing the distance from a point just within the nostril to the anterior wall of the sphenoidal sinus to be two inches and a half, as measured by a band graduated in half inches.

the curette. If the sæptum dividing the two cavities is not already broken down, a thorough exploration with a probe should be made to ascertain whether there is a perforation present through which the

secretions could pass into the adjoining sinus. If pus should find its way into the adjoining cavity the sæptum must be broken down and the pus evacuated. In Case IV, the sæptum as far as could be ascertained, was free from caries when the sinus was opened, but during the course of the treatment it became ulcerated at the most dependent part of the sinus, thus allowing solutions injected into the left cavity to pass out through the right nostril. If the fronto-nasal duct should remain closed, or if the fronto-ethmoidal cells are implicated in the suppurative process, then a communication between the nose and this cavity should be established in order to permit of free drainage. This is best done by introducing the little finger within the nostril corresponding to the affected sinus, and then passing a curved trocar through the opening in the sinus into the nose, using the little finger as a guide. A drainage-tube is now introduced through the nose into the sinus, and also one in the outer opening, and allowed to remain until all suppuration has ceased. The cavity should be irrigated daily with some mild antiseptic solution, preferably a saturated solution of boric acid, and hydrogen dioxide.

Suppurative disease of the sphenoidal sinus occurs much more rarely than it does in any of the other accessory cavities. While it does occur as an independent affection, it is more frequently observed as a complication of abscess of the ethmoidal sinus, where the thin bony partition, as shown in Fig. 3, between the posterior cells and the sphenoidal sinus is broken down and their contents discharged into the latter cavity.

Fig. 5 is an antero-posterior view of a skull showing very well the relation of the sphenoidal sinus to the superior and middle turbinated bodies.

Owing to the frequency of the implication of the fronto-ethmoidal cells in frontal sinus abscess, Jansen (4) recommends the removal of the under wall of the sinus. The same object is obtained in passing the trocar from the sinus into the nose. These cells are then drained directly into the nose.

The treatment of these cases will occasionally be found very tedious and discouraging, but if care has been taken to establish free drainage, and the antiseptic applications are thoroughly applied, the majority of patients will recover.

References.

1. *Arch. internat. de laryngolog. et de rhinolog.*, vii, 4, July–Aug., 1894.
2. *Diseases of the Nose*, 2d ed., p. 176.

3. *Archives of Ophthalmology*, vol. xx, p. 658.
4. *Archiv f. Laryngolog.*, etc., i, 2, 1893.

Discussion on the Last Three Papers.

Dr. Jonathan Wright said that the papers that had been presented on suppuration of the accessory cavities were exceedingly interesting, and the one by Dr. Bryan was one of the best that had ever been presented in this country. These cases were often very puzzling ones after operative treatment had been begun. Some years ago he had seen a case in the Woman's Medical College in which he had been unable to find any dead bone after the removal of some polypi. There had been four roots of decayed teeth in the jaw. He had supposed the case to be one of ordinary antrum disease. Under ether anæsthesia an attempt had been made to remove these roots, but in this he had failed. He had then inserted a heavy punch alongside of the roots, and, after perforating into the antrum, had succeeded in removing the fragments of the roots. The alveolar process had been so long that the Bosworth tubes had not seemed to reach into the antrum. He had then perforated the anterior wall of the antrum and inserted a drainage-tube into both openings. After three or four weeks the pus had ceased to flow from the antrum. Just as he was preparing to remove the tube and allow the opening to close, the discharge from the nose and the opening in the gum had become more abundant than ever. He had then etherized the patient again, and had made an opening of the size of a lead pencil into the antrum. Examination with a probe and electric illumination had been negative. The cavity had then been packed with gauze for several weeks, or until the discharge had ceased. But the discharge had returned after a short time. The patient had finally consented to a third operation. A long incision had been made parallel to the alveolar process, and the whole anterior wall of the antrum had been removed, so that the finger could be freely used in exploring the antrum. No pyogenic membrane could be detected, but at the apex of the antrum there had been some soft tissue, which had been curetted away. The antrum had been packed very thoroughly this time, and it had been kept packed for two or three weeks. Since discontinuing the packing there had been little or no discharge from the antrum, but the patient had got into a sort of hysterical condition and was still complaining of more or less pain in the antrum. How much of this was neurotic in character it was hard to say.

He thought the tendency with many was to operate rather too early in these cases. At one time he had been called out at night to see a physician with profuse suppuration from the nose, and with considerable fever and constitutional disturbance. By transillumination a dark spot had been found. The physician had not wished to have an opening made into the antrum at that time, and after some delay the

patient had recovered under simple washing out of the nose. Many of these cases of acute suppuration of the antrum had been seen within the past few years in connection with influenza.

Dr. Ingals said that he had been much interested in both papers, and particularly in the reference to suppuration of the sphenoid cells. During the last year he had seen three cases in which he had made this diagnosis, but he had had an opportunity of verifying this diagnosis in only one of them. He had, with the aid of a dental instrument, working at right angles from behind the palate, succeeded in perforating the sphenoidal cells on their inferior surface. With a trephine of ordinary size this could not be accomplished, because the instrument would slip on the oblique bone, but it could be done with a small trephine. After this had been introduced, the opening could be enlarged with a burr. In the case referred to, the patient had complained a great deal of burning pain from the burr, so that the opening could not be sufficiently enlarged. The opening had completely closed within two or three weeks. He had then had made a trephine about as large as a lead pencil, having a diamond-point drill running through the centre and projecting about an eighth of an inch beyond the cutting end of the trephine. With this he hoped to be able to make a large opening into the sphenoid cells without difficulty. He felt under obligations for the report of the case of melancholia, for he had a similar case to the one described by Dr. Bosworth. His patient had passed through the hands of many general practitioners and neurologists and he had removed a prominent spur from the sæptum without relief, but possibly some one of the many operations tried on Dr. Bosworth's patient would hit his case.

Dr. Gleitsmann said he wished to ask for information regarding an accident that had occurred to him in connection with opening the sphenoidal sinus. There had been an enormous discharge from the nasal cavities and also posteriorly. He had opened the sphenoidal sinus, and the patient had been relieved of the head symptoms. There had been a free discharge for seven days, and then he had been hastily summoned to the patient and had found a very profuse hæmorrhage. This had rendered an anterior and posterior tamponade necessary, and another tamponade after two days, owing to a recurrence of the hæmorrhage. He would like to know the experience of others in regard to the hæmorrhage occurring so many days after such an operation.

The speaker said that there could be no doubt about having reached the sphenoidal sinus if one had proceeded in a slightly upward direction between the sæptum and middle turbinated, about a fourth of an inch higher than the inferior border of the middle turbinated, and had proceeded to a depth of from three inches and a half to four inches. This method of opening the sphenoidal sinus had been very lucidly described by a European author—Dr. Max Schaeffer. In the chronic cases, the anterior wall of the sphenoidal sinus had been found to be

soft. He always opened the sphenoidal sinus with a strong probe and not with a trephine.

Dr. Shurly said that it was well known that there were some cases of bulbar disease of the brain in which the olfactory bulb or nerves seemed to be involved. In these cases there was a reversion of smell as well as occipital and frontal headaches, and in some instances excessive discharge from the nose. He had looked upon this discharge as a result of neuritis secondary to the organic disease of the brain. He felt that any one in general practice meeting with cases of central brain disease would recall having observed this free discharge of mucopus from the nose. He remembered very well a case of a tumor of the frontal lobes of the brain in which this had been a prominent symptom, and in which he had not been able to find any disease of bone.

Dr. Daly said that many would look upon the cure effected in Dr. Bosworth's first case as a sequence, but he felt that a still larger number would regard it as a consequence. He had had a very similar case in his own practice. With reference to opening the sphenoidal sinus, he would say teaching neurologists to enter the sphenoidal sinus with a burr drill was not so simple a matter as teaching children to put beans into their noses. He did not believe that in a given case where opening into the sphenoidal sinus was justified, it was good surgery at the present time to attempt to open it without first laying the nose to one side upon the face. This was not such a difficult or dreadful thing—it required only an incision along the posterior crease of the ala nasi and a cutting of the soft tissues of that and the cartilage of the sæptum, pulling the nose over to one side, and fastening it there temporarily with a hook during the operation, to be replaced *in situ* afterward. The scar left was unimportant if the crease line was followed.

This was perfectly justifiable in cases of such gravity as disease of the sphenoid. We all knew that no two measurements of the distance of this region were identical as given us to-day, measuring from the end of the nose, and, therefore, operating with such uncertain measurements as a guide was working merely by the "rule of thumb"—a very poor rule.

Dr. Jonathan Wright asked what the advantage was of laying the nose to one side; the nasal bones were still in the way, and would have to be sacrificed.

Dr. Daly replied that the sacrifice of some of these bones was of no consequence. He wished to be placed on record as having a desire to throw the light of day upon these operations rather than working in the dark by guess, as the measurements were absurdly diverse and in no sense a guide.

Dr. Mulhall said that it was no more dangerous to open the sphenoidal sinus than to open the ethmoidal cells, and we all opened the latter very frequently. The guard of the sphenoidal sinus was better than that for the ethmoidal cells. Apparently, very few of the mem-

bers had read the work of Gruenwald. In this book were given many measurements or rules for reaching the sphenoidal sinus through the nose. Diseases of the sphenoidal sinus, apart from the ethmoidal cavities, were certainly very rare. He had had many cases of suppurative ethmoiditis, and had operated very freely with the burr, and with no serious results. In only one case had he discovered disease of the sphenoidal sinus uncomplicated with disease of the surrounding sinus. This case had occurred in a young woman with a history of a headache which had lasted about sixteen years. On passing a probe in the direction mentioned by Dr. Gleitsmann, bare bone had been found, indicating disease of the sphenoidal sinus. On gentle pressure the probe had entered the sphenoidal sinus. He had made many dissections to determine the correctness of the measurements alluded to. Several other physicians had investigated this case with him, and no ethmoidal disease had been found. After making the opening, the pus could be blown forward into the nose and aspirated into the pharynx. The opening had been enlarged with a curette, and kept open for a considerable time.

Dr. A. B. Thrasher said that the most interesting part of this discussion to him had been the first case cited by Dr. Bosworth. In the fall of 1891 a similar case had been brought to him from the insane asylum of Columbus, Ohio. Up to a few months before, this gentleman had been an active business man. The superintendent of the asylum, who had been a friend of the man's, learned that the patient had considerable frontal pain, and that he had complained for years of much nasal catarrh. Examination had shown anterior hypertrophy of the middle turbinated bone, with marked tumefaction of the adjacent wall of the sæptum. The hypertrophy was removed. After two weeks, the patient had returned to the insane hospital, and been discharged from there as cured. Three months later, he had come to the speaker on his way south on a vacation. Since then he had been engaged in superintending his large business. The speaker said that he had always hesitated to report this case, thinking that the result might have been a coincidence, notwithstanding the fact that the superintendent and the patient both attributed the cure to the operation on the nose.

Dr. Bosworth said that, while medical literature of late contained reports of a very large number of cases of sphenoidal disease, he was disposed to be somewhat skeptical as to whether this disease was so common as was supposed by many or as these reports would lead us to infer. Certainly a careful reading of the histories of many of these cases warranted the suggestion that cases of simple ethmoid disease had been reported as sphenoid. In several instances we had reports of the sphenoidal sinus being probed or curetted by an instrument inserted from two and a half to three and a quarter inches from the tip of the nose. Such a distance would carry the probe into the ethmoid cells and not into the sphenoid. In only two instances had the speaker ever probed

the sphenoidal sinus, and in one of these a careful measurement had shown that the instrument, impinging upon the posterior wall of the sinus, had been inserted six and a quarter inches from the tip of the nose.

Dr. INGALS said it should not be at all difficult to measure exactly the distance to the anterior wall of the sphenoidal sinus. A probe could be passed back through the nares until it struck the posterior wall of the pharynx, and the distance of the wall of the sphenoidal sinus could then be measured by sliding something along the top of the probe, after the manner of a shoemaker's rule.

Dr. GLEITSMANN remarked that he could feel when he was in the sphenoidal sinus, just as any surgeon knew when he passed a needle into any other cavity of the body.

Dr. BRYAN said that he had not met with an independent case of sphenoidal abscess. A supposed case of this kind that he had seen previously had proved to be one of ethmoidal disease rupturing into the sphenoidal sinus. Another case had presented exophthalmia and other symptoms which had led him to conclude that the patient had ethmoid disease, and that the deformity of the eye was due to sphenoid disease. However, the patient had gone to another hospital, and had died there, and the post-mortem examination had shown a gummy tumor of the brain which had produced atrophy of the optic nerve. There had been some effusion in the posterior portion of the orbit, which had caused the exophthalmia. He was very glad, therefore, that he had not attempted to operate for sphenoid disease.

Paper.

A CONSIDERATION OF SOME OF THE MORE IMPORTANT PRINCIPLES OF INTRANASAL SURGERY.

BY W. K. SIMPSON, M. D.

THE great advancements toward perfection in the treatment of morbid conditions belonging to the different specialties seem to me to depend on the extent to which surgical means or principles can be called into play, or, in other words, the closer we can apply surgical principles to morbid conditions so much the more shall we meet with success in combating those conditions.

I think that the surgery of the present day, with all its great detail of antisepsis, certainly marks the nearest approach we have to exactness in medical science.

This is emphasized not only by the great results in treatment, but also by the great strides made in exploratory surgery. We can almost

say that the successful history of any of the various specialties is a *history of their surgery.*

Surgery marks in many instances the *limits* to which successful treatment can be carried out, and the proper and *conservative* knowledge of the surgical possibilities of any region becomes our corner stone in applying the principles of the healing art.

I can not leave this brief preface without emphasizing the term *conservative* surgery, as it has its bearings on *intranasal* surgery as well as on surgery in general.

True or conservative surgery, in short, may be defined as knowing when *not* to interfere. Though short in definition it comprehends a great deal. Its true interpretation comes from years of experience; it means a thorough anatomical knowledge of the region under consideration, the accidents and dangers which may befall us, but above all it should teach us to know exactly what condition we are to substitute for the morbid action we try to correct. Shall we benefit our patient? That should be our watchword.

It is not the fault of the physician that he is confronted with diseased conditions to treat; but it is the fault of the physician if he substitutes a worse condition than he finds in the first place, or unduly subjects his patient to accidents and dangers without any chance of bringing about an improvement or cure. Without enlarging on this point I sometimes think that sufficient consideration is not given to this question. It should be our duty to know how much relief we can expect by interfering, and only in a matter of immediate life or death should we subject our patients to grave chances.

I speak in this manner because, recognizing the greater benefits of intranasal surgery, we can not but admit that there is always the danger of the pendulum swinging *too far*, of our being impelled by overzeal or ignorance, thus bringing discredit on measures which, if properly considered, would ever remain of inestimable value. It is well to call a halt at times and see what we are doing, whether we are not doing too much; to call a halt and look over our table of mistakes and be guided by them. The mistakes of a fair-minded man should become his landmarks. Each of us, however successful we may be, has his full measure, and it is only by giving them their true value that we shall ever institute a safe method for future procedure.

In speaking of intranasal surgery I shall confine my remarks more particularly to treatment directed to obstructive or hypertrophic rhinitis, omitting the consideration of marked deformities or the

major conditions of cancer, either originating in the nose or spreading there from adjacent structures; the relief of these latter conditions, I believe, belongs to the domain of the general surgeon, who can call into play his more extensive methods and technique.

Perhaps there is no organ in the body which has undergone such radical changes in treatment from the old-time methods as the nose. We might say that the whole subject of intranasal treatment has been revolutionized, and intranasal surgery has become a science unto itself, and there have been brought about relief and cures which stand in bold contrast to previous methods. True, as in all other regions, there has unquestionably been too much zeal on the part of some which has occasioned more or less skepticism, but that is not the fault of the principle but rather of the individual.

Notwithstanding the fact that the interior of the nose must take its chances of repair like all regions when surgically interfered with, and must at times undergo severe inflammatory reaction in its fullest sense, it has often been a matter of some wonder to notice the comparative immunity from severe results after surgical operations of more or less magnitude; and in looking for a solution of the problem I can not but attribute it in part to the natural protective physiology of the organ. Aside from its olfactory and respiratory functions, the nose is a *great filter*, more so, perhaps, than almost any other organ in the body; it is being constantly subjected to odors, germs, microbes, foul air, dust, changes of temperature, errors of overcrowding and errors of diet, and is constantly standing between them and their pernicious effects on the economy. So no wonder that when the organ is subjected to a limited amount of destruction of its tissue it can still retain its power of protective resistance to outside influences and allow repair to go on with but little reaction.

In fact, carrying this thought a little further, in the matter of the ætiology of intranasal diseases it is this very overdoing and overstimulation of the natural physiological function of the nose that brings about many of its diseases. Markedly so are we compelled to notice this in beginning our first study of intranasal changes as they originate in children. With their successive exacerbations of coryza attacks from whatever cause, their sensitive, tender, and yielding turbinated bodies become less and less able to resist the increased demand put upon them, and they assume more and more a condition of chronic enlargement, with the almost certain added effects of stenosis, increase, retention, and absorption of secretion, and changes of intranasal contour from the effects of long-continued friction pres-

sure on the floor of the nose and on the sæptum. With the exception of atrophic rhinitis (which is considered by some to be only secondary to hypertrophic), the great array of intranasal diseases with which we are confronted are hypertrophic or obstructive in their nature, and when this condition becomes chronic, with an extra amount of connective tissue and a corresponding loss of physiological reaction, we have at once in this changed condition its own remedial suggestion—namely, mechanical reduction or removal, or, in other words, *surgery.*

Notwithstanding the resultant surgical conditions I have endeavored to emphasize, there undoubtedly exists a pre-surgical period, or, more properly speaking, a preoperative period in the treatment of intranasal diseases before permanent changes have taken place, which conditions may be overcome, all or in part, by change of climate or occupation, regulation of diet or clothing, or a general change of environment suitable to the individual patient. But as rhinologists we are perhaps most frequently consulted as this condition is merging into the more permanent one, or after the permanent changes have taken place, and I consider it one of the most important and delicate points as to operative interference at this period of transition.

A similar analogous important point arises again later in life, when we are confronted with intranasal hypertrophies and deformities in conjunction with beginning or more advanced atrophic changes incident to age or disease. Too great care can not be exercised in these mixed conditions lest in our operative procedures we convert the whole area into a state of atrophic rhinitis, which may be more deleterious than the condition we attempted to remedy.

In determining on the necessity of an operation we should not forget the fact that a perfectly symmetrical nasal interior is but rarely encountered, and we should consider well and be guided by the relations that these irregularities bear to the subjective symptoms presented in the individual case, well knowing that there is a personal equation which will permit one individual to carry well-marked intranasal deformities without any inconvenience, while the same or a less-marked deformity in another individual will undoubtedly call for surgical relief.

Choice of Operation.—With a careful adjustment of the relation of symptoms, the character and position of the tissue involved, and the extent of the mechanical pressure, the choice of the particular mode of operation reduces itself to a comparative simplicity and be-

comes a matter of individual familiarity or expertness, a due consideration of which would carry us too far into the discussion of the respective merits of the snare, cautery, saw, knife, trephine, chemical acids, or other surgical means. In general, however, we may say that means should be chosen which, with the least shock to the patient, will remove the condition most thoroughly by making the smoothest wound, destroying the least amount of mucous membrane, both immediate and adjacent, consistent with a thorough removal, producing the least amount of hæmorrhage, offering the least chances for infection, and which, when thoroughly repaired, will present the best possible normal secreting mucous-membrane surface, or, reduced to a word, that procedure is best which, when repair is completed, removes the deformity and restores the mucous membrane to its nearest normal condition. All operations should have this end in view.

Leaving the consideration of the necessity and choice of operation, the next thing which naturally confronts us is the immediate and after care of the operative wound, and this may be summed up in the one term *antisepsis*. No matter how grave or insignificant may appear our operation, a due attention to antisepsis is absolutely necessary; a very minor operation without this attention may be converted into something more serious to the patient.

It is a very easy thing for those not constantly operating in major surgery to become very lax in the application of antisepsis to minor work. If anything is to be encouraged it is an "antiseptic habit."

Our instruments should be thoroughly sterilized before the operation and should be antiseptically cleansed as often as possible during the operation. No instrument not surgically clean should be inserted in the nose during an operation or in the process of its after-treatment. Especially is this important as regards our hands, or more particularly the thumb and forefinger of our left hand, which we are *constantly* using in fashioning the cotton on our cotton applicators. I am positive that lack of attention to this point is a common means of introducing germs within the nose. This cautionary point applies not only to performance of operations, but to the daily routine work in our offices; one only has to notice the change in color of the pure white absorbent cotton after it has been rolled between fingers which are not clean to at once perceive the importance of this precaution.

The nose differs somewhat from other regions as to the application of aseptic principles in that it can not easily be made a closed cavity, thus shutting out all entrance to bacteria. With the anterior

nares plugged with antiseptic dressings, the posterior nares, through the avenue of the mouth, are still open, and the plugging of both anterior and posterior nares becomes difficult to endure if too long continued; and again, only in certain cases does the interior of the nose tolerate well the pressure of dressings. Their frequent removal and readjustment, which is absolutely necessary when used, may be the means of starting up unnecessary hæmorrhage and irritation to the wound. Unless *pressure* is indicated as a portion of the treatment, the dressings should be placed in the nose lightly, whatever their nature.

Another danger of too much and too long-continued pressure by means of dressings is abrasion of opposing mucous membrane, thus setting up the danger of adhesions or a general narrowing of the intranasal space. This *after*-narrowing is very frequently seen along the floor of the nose joining the base of the sæptum, and especially is it often noticed as an annular narrowing at the entrance of the nose. I may also say that this common after-result is not only the result of too much pressure by dressings, but is also brought about by the *wounding* of the floor of the nose during the operation. Another danger common to intranasal dressings is the increase, retention, and absorption of the secretions. While I believe in lightly applied *protective* dressings, especially at the entrance, I think we have a better means of applying the principle of antisepsis by frequent cleansing and drainage. The nose offers an ideal example for the carrying out of these means, and, when gently and carefully employed, they bring about all that is necessary.

A simple kind of wound treatment may be accomplished by beginning, first, with gently spraying a weak solution of cocaine, a half of one per cent., both as an anodyne and for the reduction of swelling, then using a diluted solution of hydrogen peroxide, to be followed with any of the more common alkaline and antiseptic solutions; this is repeated at a sitting as often as is necessary, the patient aiding by the frequent blowing of the nose and by the surgeon in removing pieces of shreds and sloughs by the forceps or cotton applicator; then, as a final application, the nose may be insufflated with some good adhesive antiseptic powder, of which there are a number from which to choose; but one of the best in my hands is the *stearate of zinc* with iodoform; this is made aromatic and does not offend in odor as much as the pure iodoform, and it has excellent adhesive qualities.

One can often see the benefit and relief of this mode of cleansing,

the nose, especially after a patient returns to us in a day or so after the operation, with the history of having been confined to the bed with an attack of the "grippe," or of "having taken a heavy cold," with that of headache, general boneache, myalgia, rise of temperature, and occluded nose; it is very convenient to allow it to be called the "grippe," but in reality it is *sepsis*, and will often be dispelled by a good, thorough cleansing of the above description.

In conclusion, I can only say that the morbid conditions of the nose for the relief of which surgical measures are to be invoked require a great deal of nicety of judgment and discrimination, alike as to the *necessity* of the operation, the *choice* of the operation, the season of operating, and the immediate and subsequent care. These principles, when duly and carefully considered, will place in our hands measures for relief which could not be attained by other means, and will serve to strengthen confidence and lessen skepticism.

Discussion.

Dr. Mulhall said that he had operated very freely, and had not yet had any disagreeable accident from the use of the galvano-cautery. He had been the first to direct attention to the fact that the electrode should never be allowed to cool *in situ*. He had always used the electrode at white heat before and after contact. He always employed an application of four-per-cent. solution of cocaine to the nostril in general previous to the application of the galvano-cautery, and a ten-per-cent. solution to the particular spot. Immediately after the withdrawal of the electrode he had been in the habit of injecting a saturated solution of bicarbonate of sodium. He considered this very important, for where no shield was used the radiation of heat to the surrounding tissues often caused a good deal of pain and swelling.

Dr. Jonathan Wright said that a few years ago he had insisted that he had not had any great reaction from the use of the galvano-cautery, but, finding that his results were not very good, he had begun to use the cautery more vigorously. Since he had done this he had very frequently met with the reactionary symptoms referred to in the paper. To obviate this he had tried most of the methods that had been proposed, except the method of applying trichloracetic acid to the surface after the use of the cautery, yet he had not found any of them satisfactory. It seemed to him irrational to blow the stearates, or "powdered candle-grease," into the nose after operations. He believed that it was necessary to add the zinc to the stearate in order that the latter might be used in powdered form. He felt sure that there would ordinarily be more or less unpleasant reaction after the vigorous use of the galvano-cautery.

Dr. J. W. Gleitsmann, of New York, said that at one time he had

recommended the use of trichloracetic acid after the galvano-cautery. Quite recently he had published another article on this method, and in this paper he had stated that he found reaction followed more frequently in those cases in which bleeding followed the galvano-cautery operation. The bleeding should be stopped before the application of trichloracetic acid. If this precaution were taken, the result of this treatment would be good.

Paper.

LUDWIG'S ANGINA.

By JAMES E. NEWCOMB, M. D.

IT is always unfortunate to attach to a pathological process the name of an individual. It may serve at first the more readily to identify the diseased condition referred to, but current views are modified in the light of subsequent study, and the significance of the chosen term gradually becomes less and less definite.

Illustrative of this fact is the experience of the term "angina Ludovici," or Ludwig's angina, which was introduced into medical literature in 1837 as the result of the publication a year previously by Ludwig, a surgeon of Stuttgart, of a series of cases of a form of inflammation of the neck not, according to him, previously described. It figured on the medical page for some time and then apparently fell into disuse. During the last ten years or so it is met with in a gradually increasing frequency.

Names are often in medicine but the fashion of one decade after another. Pathological processes remain, of course, the same. The names applied thereto may show a great variation, and the latter is in turn due to changes in view as to the ætiological factor, which often, as in the case now considered, remains an open question.

The modern conception of Ludwig's angina is well set forth in the definition given in Foster's *Encyclopædic Medical Dictionary*—viz.: "A diffuse phlegmonous inflammation of the floor of the mouth and of the intermuscular and subcutaneous tissue of the submaxillary region which may end in gangrene, abscess, or resolution, and which sometimes prevails as an epidemic." This definition, with the insertion of the word "infectious" at its commencement, will perhaps answer fairly well as a point of departure.

In regard to its epidemic character no contention has ever been made, so far as known, that it is so in its primary form. The opinion that it occurs more frequently during outbreaks of diphtheria

does not seem proved. As a sequel to, or complication of, infectious diseases it has perhaps been observed more frequently with typhus fever than with any other malady, but positive testimony to this effect is very meagre.

It is not at all certain that Ludwig was the first either to recognize or to describe this special phlegmon. Thirteen years before, Heim had observed a disease of apparently the same nature, but did not draw serious attention to the subject, though Ludwig was probably ignorant of this previous experience. Some writers, following the latter's lead, have seen in this phlegmon a special form of suppuration, a specific affection accompanied by a profound erysipelas; others, notably Bamburger, have included under this head all phlegmons of the neck. The point is, rather, whether there is or is not a special form of phlegmon of the neck which deserves a corresponding special consideration.

Naturally, our first reference is to the statements of Ludwig himself. He enumerated as the diagnostic features of the malady the following:

1. The slight inflammation of the throat itself, which, even when it is present, disappears after a day or two, and which when it persists may be looked upon as of secondary symptomatic importance.

2. The peculiar woodlike condition of the connective tissue, which does not pit on pressure.

3. A hard swelling under the tongue, with a bolsterlike swelling around the interior of the lower jaw, of a deep-red or bluish-red color.

4. A uniform spread of this induration in such a way that it is always sharply bordered by a zone of entirely unaffected cellular tissue.

5. Escape of the glands, although the disease attacks their cellular-tissue surroundings, and may even commence therein. All subsequent writers coincide as to the first four features enumerated, but many differ as to the fifth.

As case after case was reported, various names were given explanatory of the view of different writers as to the exact nature of the affection. Ludwig's own designation was "gangrenous induration of the neck." A year later (1838) Camerer was the first to use the master's name and call it "angina Ludovici." Von Thaden, in 1872, used the term "submaxillary bubo"; in 1875, Dumonteil, "sublingual abscess"; Schwartz, "sublingual phlegmon"; and Aussilloux, "subhyoid phlegmon." In 1883 Roser regarded it as an

acute inflammation of the submaxillary gland and of the surrounding cellular tissue. He asserted that it occurred in an epidemic form, and regarded it as due probably to a special infection. He upheld the morbid entity of this phlegmon, but did not assign to it a more precise anatomical site than is suggested in his definition. Boehler, in 1884, refused to regard the disease as possessing characteristics sufficiently distinctive to entitle it to a special name. Tissier and Chabrol, in 1886, styled it "infectious submaxillary angina." Chantemesse found in one case the streptococcus of erysipelas, and used the term "erysipelas of the pharynx." Other names proposed have been "diffuse cervical abscess," "diffuse cervical phlegmon," "cynanche cellularis maligna," and "cynanche sublingualis rheumatico-typhodes." In a discussion before the Surgical Society of Paris, some two or three years ago, opinions were about equally divided upon the question of specific identity, Delorme posing as the champion, and Nélaton as the opponent, of this view.

A modern definition from the clinical side, and one given by an American writer, is that of Gerster: "A phlegmonous destruction of the submaxillary gland, characterized by alarming and extensive dense œdema caused by the unyielding character of the fascial envelope of the gland, which œdema is most manifest about the latter's vicinity —*i. e.*, occupies the floor of the mouth." It will be noticed that most of the modern definitions limit the inflammatory focus to the submaxillary gland, while the older ones include a much wider area.

It is extremely difficult to decide how many cases have been reported. The references extend over a period of sixty years. All the writers have not apparently had the same thing in mind in the use of the title. A careful search has not been able to find the records of more than a hundred cases, though probably many more may be on record. Some profess to have seen many cases, but give scant particulars thereof. They seem to have regarded them as of no grave moment. Others have reported a single case in great detail. Roser professes to have seen twenty, with but one fatal result. Of these, eight resulted in external abscess and three in internal, the latter opening near Wharton's duct. Another observer found, of sixty-five thousand cases of all sorts tabulated, but ten cases of Ludwig's disease, and of these ten, seven were easily cured.

Out of the various confusing statements given, it would seem that the true way to look upon the disease is to regard it, first, as an intensely infectious phlegmon, and, second, as occurring under peculiar anatomical conditions. It is, in fact, one form of septic sore throat,

distinguishable, not ætiologically, but anatomically. Bacteriological research has thus far discovered no pathognomonic germ in Ludwig's angina. Messer, in his recent work on medical diagnosis, states that the cause is now believed to be of the nature of an actinomycosis. He is not supported in this view, so far as known, by any other writer. Still less is there any record of the presence in the discharge of actinomycetes—those peculiar bodies of a sulphur-yellow color, with a striking appearance, and not likely to be mistaken for anything else. Moreover, actinomycosis is a chronic affection, involving primarily the jaws rather than the cervical tissues. In the light of our present knowledge there is no evidence that any special infectious germ can be looked upon as the sole cause of the disease.

There is a unanimity of statement as to the post-mortem findings in the fatal cases. A general disorganization has been found of the cervical cellular tissue and muscular substance. Large sloughs have occurred, mixed with an ichorous fluid or offensive pus. In several instances the latter has burrowed down along the planes of cellular tissue to the sternum, mediastinum, and even pericardium.

Infection, as the exciting factor, may come from an infinite variety of sources. The predisposing factors are all lesions of the glands of the mouth, herpetic ulcerations of the lips, dental caries, eruption of the wisdom teeth, and amygdalitis. All these conditions favor the entrance of the virulent germs into the lymphatics, and conveyance thereby into the circumglandular cellular tissues. Cold as an exciting cause signifies very little, for we now believe that in many instances what is termed "cold" is but infection of unknown origin, nature, and mode of entrance into the body.

It is important to bear in mind just where the pus originates. The region has been named by Tillaux, in his *Topographical Anatomy*, the sublingual portion of the floor of the mouth. It is the "sublingual hollow" of Sebileau —*i. e.*, a triangular pyramidal space, the apex of which (situated below) corresponds to the point where the mylo-hyoid muscle borders the genioglossus, and the base of which (situated above) stretches along under the tongue. Its external wall, which is oblique, is formed by the internal face of the inferior maxilla and the mylo-hyoid muscle; its internal wall, which is vertical, by the genioglossus and myoglossus. The mucous membrane of the floor of the mouth and the sublingual glands close its cavity on top. The latter, some eighteen or twenty in number, with their cellular-tissue matrix, are the most important contents of this space.

Matignon finds a confirmation of these anatomical considerations in the following clinical facts:

1. The upward thrusting of the tongue on the affected side by the purulent collection shut in by the resisting muscular bands.

2. The foci of pus in the buccal cavity on the spontaneous opening of the abscess.

3. The certain issue of pus and the disappearance of the anginoid phenomena after the discission of the fibres of the mylo-hyoid muscle.

From a literal interpretation of the foregoing, the sublingual gland must be the starting point of the morbid process, but writers of recent years have chosen to assign an important rôle to the submaxillary also; yet the inflammation of this gland alone does not determine the clinical phenomena of sublingual phlegmon. Two explanations are given for this secondary infection. It may be that the germs which have determined the sublingual phlegmasia have also penetrated the sheath of the submaxillary gland, or it may be that the sublingual pus, having dissociated the fibres of the mylo-hyoid muscle, has invaded the submaxillary region.

Aussilloux's designation of subhyoid phlegmon illustrates the fact of different writers having had differing views as to the pus origin, for the subhyoid region is quite distinct from that described above.

The subhyoid region forms a part of the floor of the mouth, anterior wall, and part of the lateral wall of the pharynx. It is situated symmetrically in the median line limited externally by the inferior maxillary parabola, laterally by the carotid triangles and the internal border of the mastoid muscle, inferiorly by the hyoid bone.

Phlegmons here are subhyoid, but not necessarily sublingual. In fact, the mylo-hyoid muscle divides this general region into a deep or sublingual and a superficial or subaponeurotic portion.

The symptoms of the condition are constitutional and local. The former may be of either a sthenic or an asthenic type, following the general course of those of an asthenic fever. The local symptoms present the following diagnostic points:

1. A woodenlike induration of the affected region, sharply defined from the surrounding normal tissue.

2. The thrusting forward and upward by the accumulating inflammatory products of the tongue toward the palatal vault.

3. Severe dyspnœa with the attendant danger of laryngeal œdema.

4. The presence of a hard pad or buttonlike swelling at the internal aspect of the dental arcade. All of these occur with the general pain, redness, heat, and swelling in the cervical region—*i. e.*, the classical features of a phlegmon. Swallowing is painful if not impossible. In fact, it is next to impossible to open the mouth at all, for the muscles by which this is normally done are partly imbedded in the infiltrated cellular tissue and partly participate in the inflammation. Notably is this true of the mylo-hyoid, which, being the muscular floor of the mouth, is raised in deglutition.

The prognosis is grave. Of those cases on record, somewhat over forty-three per cent. have resulted fatally. The usual causes of death are œdema of the glottis and suffocation or general sepsis from local absorption.

A diagnosis must be made from—

A. Osteomyelitis of the jaw; but here there is no limited focus of inflammation, the bone is affected in its entirety, the inflammatory process is more generalized, and the subhyoid region is rarely involved.

B. Simple adeno-phlegmon of the submaxillary gland; but here the inflammation is more superficial, the submaxillary gland and its envelope are easily accessible, there is no wooden hardness; incision of the superficial fascia will give exit to pus, and the inflammation is localized at the outset behind the internal face of the maxilla.

C. A rare condition called Fleischman's "hygroma," which is sudden in onset, without local evidences of inflammation in the median line, and devoid of constitutional symptoms.

The statistics of only fifty-eight cases are given in sufficient detail to serve us for purposes of study. In thirty of these the cause is stated to be: Cold, 9; carious teeth, 12; dental neuralgia, 2; dental avulsion, 1; tonsillitis, 3; typhus fever (twelfth day), 1; and probable erysipelas, 2.

Sex.—Males, 44; females, 9; infants (sex not stated), 5.

Age.—Maximum, sixty-six years; minimum, three months; not stated in four. Of the remaining fifty-four, two were below one year, four from one to five, four from five to ten, four from ten to twenty, twenty-two from twenty to thirty, six from thirty to forty, six from forty to fifty, five from fifty to sixty, and one over sixty.

It is easy to see why men are more frequently attacked than women, since they are, as a rule, more often exposed to all kinds of infection. It is somewhat striking that forty per cent. occurred during the third decade of life.

Occupation.—Roser states that the majority of cases occur among soldiers, but this does not seem to be true. All classes seem affected alike. In the cases tabulated scarcely any reference is made to this point.

Results.—Recovered, 33; died, 25.

Bacteriology.—The results of culture experiments are recorded in only nine cases, inoculation being made from the evacuated pus or from the tissues—viz.: *Streptococcus pyogenes*, 4; *Staphylococcus pyogenes aureus*, 1; *Staphylococcus pyogenes albus*, 1; erysipelas coccus, 2; and in one instance an indeterminate microbe, a little longer and narrower than the *Bacillus coli communis*. It was, however, clearly distinguishable from the latter by culture reactions.

Treatment.—Outside of purely surgical procedures most of the plans of treatment which have been followed possess for us merely an historical value. They include the application of ichthyol ointment before incision, carbolic-acid injections several times daily with subsequent massage of the neck, local bloodletting, leeches and emetics, calomel and an iron spray to the throat, poultices with leeches or blisters, and antimony and ipecac internally. In three there was a spontaneous opening of the abscess; of these three, two recovered and one died, the spontaneous discharge in the latter having been followed by an aggravation of all the symptoms, especially dyspnœa, and death having ensued apparently from suffocation. In one other case a gradual disappearance of the cervical swelling, with recovery, is noted. In fifteen no statement is made referring to treatment, and of this group all but one proved fatal.

Passing to the surgical treatment, we find that in twenty-one incision was followed by escape of pus; in three others no pus escaped; in two, pus appeared on the second and fifth days, respectively, after incision. In five the results of incision are not stated. In one instance incision was made by the cautery.

With our modern surgical conceptions there can be but one justifiable procedure—namely, that embracing early incision, subsequent rigid antisepsis, and general supportive treatment. In commenting upon a case reported by another writer, in which there was a difference of opinion, as to the correctness of the diagnosis made by the latter. Gerster has expressed sound opinions worthy of quotation.

"In angina Ludovici," he says, "there is great necessity of early and ample incision. The object is not so much to evacuate pus as to relieve tension." He regards the submaxillary gland as the focus of mischief. He attaches practically a pathognomonic importance

to the fact that pressure over the œdematous area rarely elicits pain except directly over the gland. Even if the patient is unconscious such pressure will cause unmistakable signs of distress, and if these appear delay is no longer justifiable. For the operation anæsthesia is of course necessary. "There being no 'pointing,' as in an ordinary abscess, we must first expose the entire area of the gland. In a typical case it will be found more or less disintegrated, and inside its original connective-tissue envelope is ichorous fluid or thin offensive pus."

Logical also is his explanation of why in these cases fluctuation is so long delayed. We have to deal with a rapidly destructive process, the products of which are penned up within a fibrous capsule and which presents septic necrosis as its leading feature. The tension to which the tissues are subjected is accordingly very great, as is evidenced by the dense and deep-seated œdema. As a second stage of the morbid process we may have an emulsification, so to speak, of the primarily necrosed elements. Early incision, therefore, liberates only ichor, while pus may form later, but in any event the early incision relieves tension and therefore greatly lessens the dangers of pressure, suffocation, or laryngeal œdema.

A deep lateral incision over the submaxillary region is advocated by Delorme, but this is, as above indicated, a blind proceeding. Operation through the mouth permits the danger of secondary infection, and we can not subsequently carry out a sufficiently antiseptic irrigation. An incision in the median line externally may escape the foci of purulent formation and deposit. Hence the lateral incision should be preferred, and we must be sure that it goes through the mylo-hyoid muscle, as thereby alone do we reach the seat of purulent accumulation.

Note.—Since this paper was finished attention has been called to the subject by Dr. Felix Semon, of London. In a recent paper he asserts the probable pathological identity of various forms of acute septic inflammation of the throat, hitherto variously called acute œdematous laryngitis, œdema of the larynx, erysipelas of the pharynx, phlegmonous pharyngitis, and angina Ludovici. He maintains that all of these diseases merely represent degrees, varying in virulence, of one and the same process. The questions of primary localization and subsequent development depend in all probability on accidental breeches of the protecting surface through which the pathogenic microbes causing the subsequent events find an entrance. It is, according to him, positively impossible to draw at any point a definite line of demarcation between the purely local and more complicated or between the œdematous and purulent forms. His general view is summed in the statement that this theory "constitutes a simple clinical application of general bacteriological principles to a certain group of septic inflammations."

Discussion.

Dr. Daly said he desired to report in this connection a part of the clinical history of what he believed to have been the last illness of the late Dr. Rupaner, of New York city. From three to five weeks prior to this physician's death in New England he had been asked to see him professionally in Pittsburgh, where he was then sojourning, and had found him suffering from what he had diagnosticated as "sublingual phlegmon." The phlegmon appeared to be of the erysipelatous type and of the size of a large hen's egg, and all the tissues of the floor of the mouth were also enormously swollen, including the tongue. The mouth could not be closed; there was dribbling of very offensive sanious mucus, and there was a rather free offensive expectoration from a putrid bronchitis. The patient was apparently about sixty years of age, and seemed to be very greatly depressed mentally. No point of fluctuation could be detected, but it was decided to cut into the tumid tissues under the tongue, and he introduced a fasciculus of horsehair for drainage. On cutting into the tissues beneath the tongue, there was a flow of sanguinolent fluid, and from a deeper situation one of some very offensive sanguinolent pus. The horsehair was also inserted through this for drainage, and the parts were disinfected deeply with swabs moistened with a solution of carbolic acid. The next morning the patient was somewhat improved. A few days later he insisted on leaving the city for New York. The speaker said that he did not know the subsequent history of the case, but his opinion was that the doctor died of self-infection. The probable history of the case might be expected to be one of septic pneumonia following the conditions reported.

Dr. H. L. Swain, of New Haven, said that he had often thought that some of the cases mentioned in the paper, and classified as "Ludwig's angina," should, in the light of our present knowledge, be considered as examples of abscesses of the lingual tonsil. This tonsil, it was well known, was subject to all the phases of inflammation which were observed in the faucial tonsils. Two or three such cases had come under his notice, and the great degree of swelling of the tissues and glands of the neck might very easily simulate the appearances observed in a typical case of Ludwig's angina. He had quite recently treated a case of this kind successfully.

Dr. Wright remarked that there was nothing specific about the condition described as Ludwig's angina.

Dr. M. J. Asch said that it had been his lot to meet with two cases of Ludwig's angina, and in both there had been to him evidence of septic infection. There was inability to open the mouth, difficulty of breathing, with the unhealthy infiltration of the tissues seen in such infection. Both cases had occurred in young men. In one of them the inflammation had been diffused, and had been checked by free incisions, which had not evacuated pus, but ichorous and degenerated tissue.

After the patient had recovered, examination of the mouth had shown a fragment of a tooth lying in its socket, having been broken in extraction. In the other case the affection had seemed to have arisen from an acute amygdalitis. The inflammation had proceeded until it involved the whole of the neck. Glandular abscesses were opened below the jaw and just above the clavicle. Both cases were extremely grave, but the patients had eventually recovered. He had become impressed with the fact that the so-called "Ludwig's angina" was essentially septic in character, and was not a specific disease.

Dr. Newcomb said that in many of the fatal cases death had been due to septic pneumonia. He was inclined to doubt if these cases were ever really abscesses of the lingual tonsil, because in Ludwig's angina the inflammation started in a different area. Ludwig's angina was an infectious disease *at a given site.* The speaker said that this whole subject had been an enigma to him until he had seen a case with Dr. Wright at the Roosevelt Hospital. On looking up the literature he had found a great deal of confusion, and for this reason he had endeavored to bring before the society a synopsis of the views that had been held. Dr. Semon's contention that all these different varieties of throat disease were examples of sepsis might be true; nevertheless the term "septic sore throat" was not sufficiently specific.

Paper.

TUBERCULOSIS OF THE UPPER AIR-PASSAGES.—ÆTIOLOGY.

By JONATHAN WRIGHT, M. D.,

I HAVE been asked to discuss that part of the subject of tuberculosis of the upper air-passages included under the heading of ætiology. This can not be successfully done without considering the ætiology of tuberculosis, to some extent, in its general aspect. That is a broad field which reaches out in all directions. Much of it is unexplored. Perhaps some of it is not accessible at present. Eight or ten years ago it seemed as though that tiny organism, the tubercle bacillus, filled the field completely.

Of late I have been looking back to my bacteriological days and wondering a little that we now hear no more of the three "postulates of Koch" which were so familiar to us then. They have not been heard of for so long that I have almost forgotten exactly how they were worded. As I remember them, however, they were that no micro-organism could be considered an ætiological factor in any disease unless—

1. It was always present in that disease.
2. It was never found in man without the disease.
3. Inoculation with it would always cause the disease.

These proud legends were inscribed on the banner of the "high contagionists." This is not the place to speak of the history of the researches into the activities of other disease germs than the tubercle bacillus, but suffice it to say that in that history also may be observed the downfall of the postulates. As regards the tubercle bacillus, it is now always present in tubercle, somewhat on account of similar tactics to those used by Mohammed with the mountain. The old clinicians had been in the habit of calling many things tubercle, but the new bacteriologists ruled out all those pathological structures not due to the action of the bacillus. And this has proved a great gain in clinical classification, but, like all classifications in medicine, it has wrought some evil in crystallizing a certain order of mental process into a form of intellectual non-receptivity which renders further advance in individual cases impossible.

As to the second postulate, it has disappeared so completely that hardly any traces of it can be found in contemporary medical thought. The tubercle bacillus is found not only dormant in animal tissues, entangled in the meshes of lymph glands and in unsuspected foci in the lungs, but it has lately been found, as has the diphtheria bacillus, in the upper air-passages of healthy people.

It must have occurred to many others as well as to myself that the principal reason it has not been found before, and is not now found more frequently, is the difficulty of technique attending its demonstration. This suspicion is strengthened by a very suggestive bit of medical news that comes from Paris by way of the *Lancet* of May 11, 1895 (p. 1220):

Latent Tuberculosis of the Tonsils.—Professor Dieulafoy calls attention to a torpid variety of pharyngeal tuberculosis the favorite seat of which is the adenoid tissue of the naso-pharynx. This tuberculosis manifests its presence by an exuberant growth of the lymphoid organs of that region—in other words, by hypertrophy of one or more of the palatine and pharyngeal tonsils. This view of Professor Dieulafoy would, if confirmed, lead us to regard hypertrophy of the tonsils and adenoid growths as, in many instances, cases of tuberculous overgrowth of adenoid tissue. He bases this belief on the results of inoculations practised on guinea-pigs of fragments of enlarged tonsils and adenoid vegetations. Of sixty animals thus inoculated with tonsil tissue, eight, or thirteen per cent., succumbed to generalized tuberculosis, while of thirty-five inoculated with adenoid tissue, seven, or twenty per cent.,

became tuberculous. In all the persons who furnished the material for inoculation (enlarged tonsils and adenoid growths) the pharyngeal tuberculosis was primary and not consecutive to the pulmonary variety. It is to be supposed that the young subjects who have enlarged tonsils, etc., provide a favorable soil for the growth of the bacillus of Koch, which finds access to the adenoid culture medium either with the food, milk especially, or with the air respired (sojourn in a bacillary atmosphere). Professor Strauss, of Paris, has, indeed, demonstrated the presence of virulent tubercle bacilli in the nasal cavities of individuals habitually breathing the same air as phthisical patients. An open wound is not necessary for penetration, since the bacilli can find an entrance through the epithelium. In some instances the bacilli present in the adenoid tissue are, after a sojourn of months or years, destroyed by phagocytosis, which determines an indurating, fibrous process in the tonsil. In other cases, however, the bacillus finds its way into the lymphatic vessels, and enlarged submaxillary and cervical glands are the result. This lymphatic infection is often started by the occurrence of measles, scarlet fever, whooping-cough, etc. This glandular tuberculosis may, in its turn, remain local, and finally end in recovery; but in other instances rapid generalization may result. The third stage of tonsillitic tuberculosis is the spread of the process to the lungs, the bacillus reaching those organs from the cervical glands via the lymphatics, thoracic duct, and the right heart. In the course of the discussion raised by this most interesting communication M. Chauveau stated that in animals fed on tuberculous matter infection may take place by inoculation of the adenoid tissue of the base of the tongue and the isthmus of the pharynx, this inoculation being proved by the swelling of the cervical and submaxillary glands. Sometimes a minute erosion explains their inoculation, but often the surface was found intact.

I have read this extract in its entirety, but it is too early, without having seen the original paper of Dr. Dieulafoy, to make any comment on the subject beyond saying that, although Lermoyez has reported two cases of tuberculosis following operations for post-nasal adenoids, we are not accustomed to expect any such result either from an adenotomy or from an amygdalotomy. I only quote it here to show how far we are from the second postulate mentioned above.

Now in regard to the third article in the early bacteriological creed. It has been invalidated somewhat indirectly by the general trend of facts recently ascertained such as I have just instanced. It is doubtless true that a Pravaz syringeful of broth swarming with tubercle bacilli will kill *any* guinea-pig. It is very likely true that it will kill *any man*, though direct evidence on that point is lacking, but clinically a Pravaz syringe thus used does not enter into the ætiology of tuberculosis.

I need not pursue ancient history further. Indeed, some of you are doubtless already saying that I am setting up men of straw for the pleasure of knocking them down. Until lately, however, they were not thought men of straw, and I have taken these early postulates as an excuse to place before you a little of the evidence which we have clinically and experimentally, that the tubercle bacillus, although being the "*sine qua non*" of tuberculosis, is after all practically, especially from a prophylactic or hygienic point of view, a minor element in its multitudinous ætiological factors. I think we are gradually approaching a belief that every one at some time in his life comes in contact with such a dose of the tubercle bacillus that, were the other ætiological factors also present, he would die of tuberculosis. We know that one in seven deaths are due to tuberculosis. The autopsy table has shown that in one in two or three of all the cases examined there is evidence discoverable of the active or the conquered onslaughts of the bacillus. Now there *must* be a good many other cases in which the tubercle bacillus has perished without leaving a trace behind him—on the skirmish line as it were.

Cornet showed a good while ago the high rate of mortality among those confined in prisons and workshops from tuberculosis, and he reasoned that it was because of the contact with the tubercle bacillus.* I need not follow the history of clinical and experimental investigations which make us now believe that the high mortality is due not to the bacillus, but to the prison and workshop. It has been conclusively shown that no higher mortality exists among the consorts of tubercular patients than among other husbands and wives, but the page of every clinical history book will show a different story where the children of such patients are concerned. Is the death-rate of tuberculosis strikingly high among doctors? Is it the impression of the members of this association that more than one

* Since this was written, I have lately seen that Cornet has reiterated his belief, though not quite so emphatically. He said in a paper read before one of the German medical societies that the mortality from phthisis had fallen greatly since the institution of precautions recommended by him against infection from tuberculous sputum. In the discussion which followed, Baer rather spoiled the force of this remark by expressing a doubt as to whether the mortality from phthisis had diminished on account of these precautions or because of the general reform in furnishing the prisoners with better air, food, and exercise. For a very strong plea for the side of the question opposing the views I have expressed here, see Cornet's paper and the discussion in the *Berl. klin. Woch.*, May 20, 1895.

in seven of our *confrères* die of tuberculosis?* In the hospitals and dispensaries and in our offices we meet the tubercle bacillus face to face every day. It is gradually becoming known that a very large proportion of all dairy cows, especially of the Alderney breed, are tubercular. It is the children of the well-to-do, if not of the rich, that are brought up on this milk. The poor suckle their children themselves. It is hardly necessary to ask among which class we find the largest proportion of tubercular children. This fact has been noted for years, and so far as I have observed has never been satisfactorily explained by the "high contagionists."

Experimentally Prudden has shown that he can produce a lesion identical with tubercle without the action of the *living* tubercle bacillus, and a French author has said *inversely:* "The bacillus is not enough, we must have the characteristic reactional lesion—the tubercle." As clinicians we may say, and we should say it boldly, that neither the tubercle nor the tubercle bacillus, nor both together, are enough. The tubercle bacillus is at one end of the chain and the tubercle is on the autopsy table at the other end of it. Tuberculosis to us does not mean either of these. It means to us both of these, plus the vital energy of the bacillus on the one hand and that of the resisting human organism on the other.

We group all the other factors in the general ætiology of tuberculosis under the head of "predisposition," divided into such vague terms as low vitality, heredity, scrofula. And apropos of scrofula, before leaving the subject of general ætiology for that of the special ætiology of tubercular disease of the nose and throat, I desire to quote some words of Ziegler (*Allgemeine Pathologie*, etc., 8te Auflage, Band i, S. 614):

"According to our experience, the disposition to tuberculosis is in the human race a greatly varying one, since only a part are predisposed to it. According to current views, scrofula—*i. e.*, a sickly condition of the organism, which is revealed by a tendency to certain disturbances of nutrition of the skin, of the mucous membranes, of the joints, of the bones, and of the lymph nodes—predisposes to it. It may here be remarked that many of the manifestations which are ascribed to *scrofula are really already manifestations of a tubercular disease.*"

Of course, in these few remarks I have not pretended even to touch

* Dr. Kortright, in the *Brooklyn Medical Journal*, June, 1895, says that statistics prove that the doctors do not average as high a mortality from phthisis as other classes in the community.

on all the points in the general ætiology of tuberculosis, but have only hinted at some of them, and we must now consider those special influences which determine its primary and especially its secondary location in the upper air passages.

There are certain facts which seem clearly to indicate that there exists in the nose and throat some special local resisting power exerted against the entrance of the tubercle bacillus, or that there exists some special local annihilating influence upon the bacillus after it has gained an entrance into these mucous membranes. If we are not disposed to deny the possibility of a really primary occurrence of tuberculosis in the larynx, we are certainly not in a position to deny that even its apparent occurrence is an extremely rare clinical phenomenon. Supposing that the inspired air is the bearer of tubercular infection to the lungs, the conclusion inevitably follows that the nose and throat, as compared to the lungs, must possess a more complete protection, for elsewhere I have shown experimentally that the former retain from the inspired air all but a fraction of the floating germs before they reach the bronchi. Were it not for some protecting factor, primary laryngeal tuberculosis should be at least as common an occurrence as primary pulmonary tuberculosis.

Krückman * has lately shown, by a large number of very carefully conducted examinations, that in adults the tonsils and cervical glands are usually infected by the tubercle bacillus *after* the lungs are the seat of disease.

On the other hand, in children, he seems to believe, and we know that clinical evidence goes to show, that the cervical lymphatics are usually affected before the pulmonary portachyma. Supposing, however, that the tubercular infection is carried by the lymphatics in both adults and children, we reach the same conclusion of comparative laryngeal immunity when we remember how extremely rare tubercular laryngitis is in children.

Now what are these protective factors in the upper air-passages? So far as lymphatic channels of infection are concerned in the larynx, we may advance the explanation of the scanty anastomosis of the internal and external vessels. We have a clinical evidence of this in the late stage at which enlarged cervical lymphatics are discoverable in the cases of laryngeal cancer, but this will not explain the pharyngeal immunity.

* Krückman. Virchow's *Archiv*, No. 138, Heft 3, p. 534. I also desire to call attention to the paper published by Sims Woodhead in the *Lancet*, October 27, 1894.

If Dieulafoy's recent observations are reliable, we may explain by them the origin of some of the cases of tubercular meningitis in children, for there is direct and abundant communication between the naso-pharyngeal and the intracranial lymphatics, but these observations, if accurate, throw no light on the cause of comparative immunity of the nose and throat in children to recognizable tubercular lesions, but on the contrary would make it more apparent, for I imagine it will be shown that lymphoid tissue is not the product but the lurking place of the tubercle bacillus.

The same reasoning applies when we remember the fact that only fifteen to thirty per cent.* of all cases of pulmonary tuberculosis, even at autopsy, are seen to be also victims of laryngeal tuberculosis. As said before, all cases should present laryngeal lesions, were there not some protection against the virulent cultures of the bacillus in the sputum which bathes the larynx.

I do not propose to go into the history of the literature of laryngeal tubercular infection. You are all familiar with the old theory of Louis as to the corrosive action of the sputum. It occurs to me that the chief objection to Louis's doctrine, as he meant it, is that no one has yet shown that sputum from tubercular lungs possesses any chemical erosive properties. You know that Eugen Fraenkel has demonstrated the tubercle bacillus in the surface epithelium and in the superficial layers of the mucous membrane. This has not been confirmed by many of the workers at the problem, but lately has been corroborated by the investigations of Mr. Lake, published in the April number of the *American Journal of the Medical Sciences* for 1895. He says, however, that the pyogenic cocci first make a breach by getting in between the epithelial cells and, multiplying

* Heinze is the only author who goes as high as fifty-one per cent. It must be remembered that these are statistics from the autopsy table, and these must differ materially from what is observed laryngoscopically for three reasons: Firstly, and chiefly, comparatively few persons dying of phthisis have ever had a laryngoscopic examination. Many tubercular lesions of the nose and throat exist without symptoms referable to them. Secondly, many tubercular lesions may escape observation even in the most thorough rhinoscopic and laryngoscopic examination. Thirdly, many tubercular ulcers appear in the upper air-passages only when the patients are "*in extremis.*"

Through the kindness of Dr. Arrowsmith and of the other attending physicians, I have been able to examine twenty-five patients in the Brooklyn Home for Consumptives, all of them suffering from the lesions of the second and third stages of pulmonary phthisis. In only four of these, or sixteen per cent., were tubercular lesions found in the nose and throat.

there, form little abscesses which result in superficial erosions through which the tubercle bacillus itself enters, it having been shown that the bacillus itself is unable to produce abscesses. It is not necessary here to discuss Friederich's idea that the pneumogastric, in some cases of pulmonary phthisis, by becoming affected produces a trophic lesion in the larynx which allows the tubercle bacillus to enter.

I must, however, refer to an excellent paper by Thost,* who claims that the bacillus frequently enters by way of the glands, in whose epithelium he claims that tubercle frequently develops. This, however, is strenuously denied by Fraenkel. It is well to remind you here that Virchow long ago cited the larynx as the situation where typical tubercle structure could best be studied microscopically.

For several years I have been in the habit, when opportunity offered, of making sections transversely through the trachea and larynx of stillborn infants or of those dying shortly after birth. I had frequently noticed that the epithelial layer in these transverse sections had a wavy outline—that it was thrown into folds; it seemed too redundant as a lining for the tube. In the larynx this is especially noticeable in the interarytænoid space. At first I supposed these folds were due to the shrinking from prolonged soaking in alcohol. Lately, however, I have examined specimens prepared by preliminary fixing in four per cent. formalin, and the same phenomenon is observable, as you see in this drawing of a section from just below the vocal cords by camera lucida and a low power (Zeiss A) objective (Fig. 1).

If you will examine the beautiful photographs made by Prof. B. Fraenkel † of similar sections in adults, you will note the same appearance. Both in adults and infants, and also in animals (I have sections of pigs' and calves' and kittens' larynges), it will be seen that the epithelial and subepithelial layers are connected by very loose areolar tissue with the underlying firmer fibro-elastic connective tissue and perichondrium of the air tube. Now this evidently subserves a very important physiological function, and one which has a direct bearing on our subject. When a child screams, when a stentorian street hawker shouts his wares, when a consumptive has a paroxysm of coughing, the air tube is put on the stretch, the fibro-elastic elements may dilate by the shortening of the trachea as the thorax is heaved up, but the epithelial layer would suffer constant damage were it a "tight-fit" lining. The greater part of the epi-

* *Monatschr. f. Ohrenheilk.*, No. 2, February, 1893.

† B. Fraenkel. *Archiv für Laryngologie*, Band i, Heft 1 and 2.

thelium is columnar. These long, narrow cells lie side by side, with their ends pointing outward toward the enemy. Were there no folds to be smoothed out like an accordion pleat, those cells at some one or more points must be dragged apart whenever the air tube should be violently distended.

Fig. 1.

In adults these folds are less marked than in children; the areolar tissue binds the epithelial layers more firmly to the walls. Every attack of laryngitis tends to damage this physiological arrangement by stiffening the subepithelial structure and by hyperplasia of the epithelial cells. Much more must this be the case in chronic inflammations, where we also find some metamorphosis of the columnar into the squamous type of epithelium. This latter is especially seen in phthisis on the posterior laryngeal wall. E. Fraenkel states that the base of the arytænoid cartilages at the internal and oppos-

ing faces of the vocal processes, where rubbing occurs during phonation, is the most frequent site of beginning laryngeal tuberculosis.

This may possibly be true of ulceration, but my clinical experience disposes me to think it is the interarytænoid space. That situation at least is surely the place in which we first see that heaping up of pearly epithelium which is so significant to the experienced laryngologist.

After this study of physiological and pathological processes we are prepared to admit many of the causes to which are usually ascribed the supervention of laryngeal upon pulmonary tuberculosis —low vitality, the paroxysmal cough, the mechanical rasping of the sputum against the laryngeal walls, especially at the posterior commissure, repeated attacks of acute laryngitis or the presence of the results of chronic laryngitis, the overuse of the voice, exposure to cold and dusty winds, etc.

Tubercular ulceration of the pharynx is usually seen only in the very last stages of pulmonary and laryngeal phthisis, when the systemic and local vitality is at a low ebb, or in acute miliary tuberculosis when we have apparently some sudden weakening of the special factor which protects the system ordinarily from the ravages of the tubercle bacillus. Most of the cases of nasal tuberculosis which I have seen have been due to this low vitality at the end of pulmonary phthisis, and those cases of tubercular tumor which I have read of and not seen are apparently due to the abrasion of the finger-nail or to some other traumatism, as they are mostly reported as occurring anteriorly on the sæptum or on the anterior ends of the turbinated bones.

There is no more time at my disposal to enter into a discussion of the question of the spread of tuberculosis by means of the lymphatics and blood-vessels. While it seems apparent that the method of infection is usually from the external surface through a gap in the epithelium, it can not be denied that the larynx is theoretically just as apt to be affected (barring the scantiness of the lymphatics) by means of the lymph and blood-vessels as are the knee and hip joints; and practically there are many clinical and morphological facts which go to sustain its actual occurrence in many cases.

Paper.

THE DIAGNOSIS OF TUBERCULOSIS OF THE UPPER AIR-PASSAGES.

By CLARENCE C. RICE, M. D.

IT has seemed to me that it would be of more service to an association like this, composed of members of great experience, thoroughly expert in clinical diagnosis, to mention, as far as possible, the usual and unusual manifestations of tubercular disease of the upper air-passages, pointing out their similarities and dissimilarities to other pathological conditions, rather than to follow the beaten track, and endeavor in minute detail to tabulate the differential diagnosis between the ordinary tubercular and syphilitic ulcer, and between the tubercular enlargement and the benign or malignant neoplasm. The unusual manifestations of tuberculosis are, of course, the only difficult ones of recognition, and our purpose is served if we have described their laryngoscopic appearances.

Tuberculosis of the Nares.—I think it is of little importance for me to do more than to allude in the briefest way to tubercular disease of the nasal passages. I do not know that I have seen a case, although I think it is possible that we all may have removed small growths attached by a pedicle to the turbinated tissues which microscopically might have been tuberculous structure.

Nasal tuberculosis is an exceedingly rare disease. Williglk,* in four hundred and seventy-six autopsies of tuberculosis, found only one in which the nose was involved. In twenty-seven cases collected by Bosworth all but three were associated with pulmonary disease, and these may not have been tubercular. It manifests itself in two forms, one the ulcerative, which is preceded by tubercular infiltration in the form of small nodules. The ulceration is almost always found on the nasal sæptum or the floor of the nose. The other form manifests itself in small growths, usually as large as a pea, which are commonly attached to the turbinated tissues. If ulcerations become tubercular by surface inoculation, we should suppose that syphilitic ulcerations of the nose, which are common, might become inoculated in this way in cases of phthisis pulmonalis.

As to the diagnosis, we should be suspicious of any chronic ulceration of the nose which resists the effects of iodide of potas-

* Williglk. *Sectionsergebnisse an der Prager path.-anat. Anstalt.* From February 1, 1850, to February, 1852.

sium, and which is associated with tubercular pulmonary disease. If, in addition to these symptoms, the secretions from the ulceration furnished tubercle bacilli, the diagnosis would be made. The microscope alone will determine the character of any neoplasm. Perhaps I ought to mention the possibility of the presence of lupus in the nose, which also is probably a tubercular process, since the tubercle bacilli have often been found in the ulcerations of lupus. It is possible that some of the ulcerative cases which have been called tuberculosis of the nares have been lupus. Lupus of the nasal mucous membrane is usually an extension inward from a facial cutaneous ulceration.

Tuberculosis of the Palate and Pharynx.—Tuberculosis of the pharynx is of more interest to us clinically than is nasal tuberculosis, because it occurs more frequently, because it produces symptoms which are very distressing, and because it is always necessary to differentiate between the tubercular ulcer of the mouth and pharynx and that of syphilis. Williglk, in 1,317 autopsies of tubercular cases, found the larynx involved 237 times and the pharynx once. Louis found four cases of pharyngeal tubercular ulceration in one hundred and twenty patients. It seems to be generally believed that tuberculosis of the palate and pharynx is usually associated with a general acute miliary tuberculosis, a process involving several organs of the body, rather than with the ordinary chronic pulmonary phthisis. Just why the acute miliary form should show a disposition to attack the palate, which almost always escapes the tubercular infiltration so commonly found in the larynx, we can not say.

Tubercular infiltration here is probably always secondary to deposits elsewhere, although we find cases reported where tubercular infiltration in other organs was not discovered until some time after it appeared in the pharynx. It is not often that we have an opportunity of watching the development of the miliary nodules before they break down into the ulcerative stage. Dr. Bosworth has seen two out of a total of five cases in which he was able to watch the miliary deposits in the soft palate for several days before ulceration appeared. The nodules remain not more than a week. The disease here as elsewhere appears in the two stages of infiltration, which is in the form of grayish-white nodules, and the ulceration which follows.

There is really only one other form of ulceration of the pharynx for which the tubercular can be mistaken, and that is the syphilitic; but when we remember that there are ninety-nine cases of syphilitic

ulceration in the pharynx to every one of a tubercular character, we can appreciate how rarely tubercular ulceration is found in this location. The same diagnostic points which would be applicable to ulceration of the larynx are true of the pharynx, as the tubercular ulcer here has the same characteristic grayish-white surface, commencing usually in the soft palate, spreading laterally toward the pillars of the pharynx by the union of many minute erosions. If the deposit has come on rapidly and before the patient has become emaciated, there may be hyperæmia of the mucous membrane for a time, but this is quickly followed by the marked pallor which is so characteristic.

All authors speak of the great amount of pain which accompanies tubercular ulcers of the pharynx. There should be no difficulty in differentiating tubercular ulceration of the fauces from epithelioma, and we need hardly speak of the differential points. There never is tissue thickening enough associated with tuberculosis of the pharynx to resemble a malignant neoplasm. There is probably a time when tubercular infiltration of the velum is accompanied by the same semi-œdematous swelling of the tissues seen in the larynx.

Tuberculosis of the Larynx.—It will probably be admitted by all that in the great majority of cases the diagnosis of tuberculosis laryngis, by means of the laryngeal mirror alone, in the hands of men accustomed to examine the upper respiratory passages, is a comparatively easy task.

In typical cases the appearances presented are so characteristic and striking and so different from those of any other form of laryngeal disease that a laryngologist of but little experience should have no difficulty in determining the kind of inflammatory process. So true is this that typical cases of laryngeal tuberculosis are always demonstrated to the pupil by the instructor, because the appearances seen in the mirror are so characteristic and uniform. And it is to be expected that the pathological appearances of this disease would be easily distinguishable from other forms of inflammation of the larynx, when we remember that this destructive process is entirely unique in character and that it involves special structures. It is easy, however, to understand why authors of large experience in laryngeal disease should hold such widely different opinions in regard to the ease of diagnosticating tuberculosis of the upper air-passages. It is because, although in the great majority of instances we can read the name "tubercular laryngitis" in the mirror as soon as it is held in position, there are cases which may easily be con-

founded with syphilis or with growths of the larynx. We should think that eighty per cent. of the cases could easily be diagnosticated by a skillful clinician, and that in the remaining twenty per cent. considerable care would need to be exercised before an authoritative opinion was stated, and that in perhaps one half of this twenty per cent. a decision could not be reached without the aid of the microscope or the employment of iodide of potassium.

Von Ziemssen's statement that "a tubercular process in the larynx can not be definitely recognized as such by ocular inspection in those cases in which the diagnosis is unaided by a previously existing pulmonary disease," need not be considered of great moment, because we do not often see tuberculosis of the upper air-passages except as it accompanies the same disease of the lungs. We should rather concur with Lennox Browne, who says that "we know of no disease in which with the laryngoscope we can be so sure of our diagnosis." Nevertheless, we shall see many cases where it will be impossible by ocular inspection alone to decide as to their true character. The examination of the larynx, the careful history of the patient, the microscopical investigation, and the test of the iodide of potassium must all be carefully employed, and after all this there will be a few cases where we shall have to depend, as Dr. Bosworth says, upon the "diagnostic instinct."

I presume we are all in the habit of making the diagnosis of laryngeal tuberculosis very frequently before examining the larynx at all. The emaciated condition of the patient, the chronic cough, the fever, the huskiness of voice, the shortness of breath, the pain in swallowing, all these point to tuberculosis of the lungs and larynx with great directness, and yet teachers before a class of students know how dangerous it is, even with nearly all these conditions present, to give an opinion until the lungs have been examined and the larynx carefully inspected.

Since nearly all of the tuberculosis of the upper air-passages involves and is confined to the larynx alone, it will be wise to consider the diagnosis of tubercular laryngitis more carefully and from *three* points of view. First and very briefly, we may speak of the diagnostic points of the ordinary or typical cases; second, we shall endeavor to mention those very early appearances in the larynx which are thought to be significant of an incipient tubercular laryngitis, and which are sometimes present in the larynx before it is easy to recognize any disease in the lungs, or before bacilli can be found in the expectorations; and third, it will be well to cite the irregular cases

which are difficult of diagnosis, because they coexist with other diseases of the larynx, or because they present appearances not more typical of tuberculosis than of some other pathological condition.

First, the diagnosis of the typical cases. Can any disease present appearances more easily recognized than that tumefaction of the larynx due to tubercular infiltration, that pale, boggy semi-opaque, partly œdematous, partly inflammatory swelling of the arytænoid cartilages which has given to them the name of "club-shaped," and to the epiglottis that of "turban-shaped"? We can think of nothing that such enlargements, if they are bilateral and involve both the epiglottis and the arytænoids, resemble, unless it be an œdema of the larynx; but a diagnosis between these need hardly be considered because the cases are so widely different in their entire history, the one being an acute and the other a chronic process. Lennox Browne says that tubercular infiltrations have not the clear transparency of an œdema, nor the active inflammation of simple laryngitis, nor the hyperplastic infiltration of syphilis. This states it in a correct and graphic way. When tubercular infiltration attacks only a single arytænoid, then the question will arise as to whether the process may not rather be a syphilitic one, or an idiopathic perichondritis, or possibly some variety of neoplasm. Unilateral enlargement of the crico-arytænoid articulation is a very rare manifestation of tuberculosis. In single swellings of this kind the condition of the lungs, the presence of bacilli, and the effect of iodide of potassium will alone enable us to call the process by the proper name. In my experience, tubercular infiltration involving the submucosa over both arytænoid cartilages is much less likely to progress to a perichondritis and ankylosis of the joint than is a tubercular process confined to one arytænoid.

The remarkable anæmia of the larynx, and that, too, before the patient has become pale and emaciated, is another characteristic sign. We should not forget that the color of the mucous membranes usually bears a close relation to the general condition of the patient. We expect a pale mucous surface in a chlorotic subject, but the discrepancy between the two in tuberculosis laryngis is remarkable.

It may be true, as Cohen * says, that "the earliest recognizable state of the *acute* form of laryngeal tuberculosis is almost always manifested by marked congestion of the mucous membrane, and the earliest recognizable stage of the chronic and much more frequent form is almost always manifested by marked pallor of the mucous

* Cohen. *American Journal of the Medical Sciences*, January, 1883.

membrane." By the acute form we understand the kind of laryngeal tuberculosis which is associated with acute miliary tuberculosis of the lungs and with a general tuberculosis. We doubt if there is frequently an opportunity of witnessing a diffuse miliary infiltration of tubercle within an acutely congested larynx; while pathologically it seems quite possible that there might be infiltration and breaking down before the larynx became anæmic, we do not believe that clinically it is often seen. Are these the so-called "catarrhal" ulcerations which some observers think not uncommon? We confess having but little faith in their frequent existence.

If a typical case is seen during the first stage of infiltration, and can be watched while the tissues are undergoing a carious process, the ulcerations can hardly be confounded with those of any other disease. It is only when a small ulceration appears on the vocal band and remains limited in extent without affecting the cord generally, or when the surface of the bands has been changed by strong medications or surgical treatment, or when sprouting of new tissue has occurred at their edges or over their floor, that it becomes difficult to classify them.

We do not think it of importance to consider at any length whether the ulcerations occurring in tuberculosis of the larynx and accompanying pulmonary phthisis differ in their pathology, and hence in their clinical aspect, because we believe it is generally admitted that the older attempts of pathologists to classify ulcerations of the larynx coexisting with pulmonary consumption into such divisions as the aphthous, the diphtheritic, and the early catarrhal ulcer, which later becomes tubercular, have not been proved to be founded on correct pathology or on consistent clinical behavior.

Heinze, in the examination of laryngeal ulcers occurring in tubercular laryngitis, stated that eighty-three per cent. were tuberculous and seventeen per cent. non-tuberculous; but this was in 1876. We believe at the present day, with the better methods of microscopical examination, he would have decided that a much larger proportion were tubercular.

We notice that most authors of the present day very wisely do not mention any necessity of diagnosticating different kinds of ulcerations in tubercular laryngitis. We think that the belief in the existence of different varieties of ulcerations in tubercular laryngitis was entertained more because of the various shapes they assume than because of any differences they presented microscopically. We do not mean to speak of the pathology of tubercular ulcerations of

the larynx, but we suppose that the day has gone by when it is commonly believed that ulcerations the result of a simple catarrhal process are converted into tubercular ulcerations by inoculation at the surface.

Dr. Solly,* of Colorado, has written an instructive article on tubercular laryngitis, because his statistics have been carefully prepared. In two hundred and fifty cases of pulmonary tuberculosis there were forty-five in which the larynx was involved; twenty-five of these forty-five had not broken down into ulceration at the time of the first examination. In his cases the ulcerations were situated upon the true cords in fifty per cent., upon the arytænoids in forty-five, in the interarytænoid commissure in thirty, upon the epiglottis in the same proportion, and upon the ventricular bands in twenty per cent.

It would be an endless task to describe in detail the appearances of the many-shaped ulcerations of laryngeal tuberculosis in their stages of progress. Certain terms are commonly used to describe them, such as "moth-eaten," their resemblance to the surface of cut bacon and to the track of earthworms in wet sand, and their "mouse-nibbled" appearance.

Bosworth, in his text-book, lays great stress upon the point that there is very little loss of tissue attending a tubercular ulcerative process, because the tubercular infiltration in the deeper structures all the time compensates for the destructive process going on at the surface. This is not always true, because we frequently see the ulcerative surface depressed below the surrounding tissues, but it certainly describes accurately one characteristic of tubercular ulcerations. The grayish ulcer of tuberculosis, covered sparsely with clinging secretion, presenting feeble indications of inflammatory action, hardly depressed at all below the surface, spreading laterally but not in depth, and uniting with other small ulcerations, should not be difficult to recognize.

We think that the tertiary ulceration of syphilis occurring in a debilitated patient is the one which in appearance is most closely akin to tubercular ulceration.

We do not think that the tubercular ulceration is commonly difficult to diagnosticate from the ulcer of syphilis when the latter occurs in a fairly healthy patient.

Now, in regard to the earliest manifestations of tubercular laryngitis: Are there any signs which may be considered as pointing significantly to its development before the stage of infiltration occurs?

* Solly. *Therapeutic Gazette*, November 15, 1893.

I think that we are all suspicious of localized anæmias of the hard and soft palate in a pharynx which otherwise presents a healthy appearance. With this pallor we have noticed enlarged capillaries merging from the different portions of the palate toward the uvula.

The enlargement of the papillary layer in the interarytænoid commissure, however slight it may be, is also a suspicious sign.

I have sometimes detected, I believe, the very commencement of change in this location, hardly noticeable without the most careful inspection, when the attention was directed toward its possible existence by imperfect approximation of the vocal bands posteriorly rather than by any swelling. Feebleness of action of the transverse or arytænoid muscle or of the thyreo-arytænoid muscle are points to be considered.

In a paper read before the Academy of Medicine some weeks ago on The Importance of Administering Iodide of Potassium in Cases of Laryngeal Disease of Doubtful Diagnosis, I commented on Dr. Wright's review of Chiari's paper entitled Structure of So-called Fibromata of the Vocal Bands. As will be remembered, the ground taken by the author was that these growths are inflammatory and not *neoplastic*, since they show oftentimes inflammatory phenomena. Dr. Wright says in his review that it is "a superficial, misleading, and dangerous proceeding to calmly describe growths as fibromata, myxomata, etc., when they are, in the vast majority of instances, nothing but different manifestations of chronic inflammation." If these neoplasms are the result of the different well-known inflammatory processes, we must consider their possible relation to a tubercular infiltration; that some of them are the result of a syphilitic dyscrasia can not be doubted, and there has long been a feeling that so-called simple papillomata of the vocal bands were often nearly related to tubercular infiltration, so that it is quite possible that we may consider recurring papillomata an early manifestation of tuberculosis.

I do not remember to have seen that tubercular tissue has been found microscopically in well-marked papillomatous growths, but I have a record of two cases in which simple warty papillomata existed in the larynx two and four years before tubercular laryngitis appeared. If one or more of these conditions which I have mentioned are found, we should naturally examine the lungs for evidence of disease there, and the expectorations for tubercle bacilli.

The slightest appearance of bogginess of the arytænoids is always, I believe, significant. We frequently see marked congestion of the arytænoid cartilages in a larynx perfectly normal otherwise, the

arytænoids themselves being firm and hard in appearance; this is also suspicious of an incipient tuberculosis. Localized congestions are to us suspicious as indicating the seat of infiltration prior to the stage of swelling.

The third division of the subject—that is, the difficulty of diagnosis because of the coexistence of tubercular laryngitis with other diseases, or because of the unusual manifestations which tubercular laryngitis sometimes presents—needs now to be spoken of.

It is unquestionably true that syphilis and tuberculosis of the larynx coexist frequently. How often do we listen to a history of syphilis acquired early in life and find that pulmonary tuberculosis has followed later. Is it not possible that a patient may have at the same time pulmonary tuberculosis and syphilitic ulceration of the larynx?

In 1889 I called attention to the most marked case of this kind I had ever seen. In such cases the presence of lung disease and of tubercle bacilli will be considered the convincing points.

An unusual manifestation of tubercular ulceration of the larynx, and one very rarely seen, is the adhesion between approximating ulcerative surfaces. This is common enough in syphilis. I referred to such a case in a paper read before this society in 1889. The adhesion was between the anterior ends of the vocal bands.

Cohen * speaks of a similar case, and Ingalls also refers to the possibility of adhesive inflammation between the vocal cords. My case was diagnosticated tubercular because the patient had pulmonary tuberculosis and because iodide of potassium had no effect upon it whatever. Still we admit the possibility of its having been syphilitic.

Other unusual manifestations of tubercular laryngitis, and difficult of diagnosis because of their infrequency, are several forms of new growths. We know that in tubercular laryngitis there is very slight reparative power. Ulcerations show but little tendency to throw out from their bases or edges connective-tissue hypertrophy. So much are we impressed with the feebleness of tubercular structure that when we see any disposition toward the formation of granulation tissue we are inclined to believe that the ulceration is other than tubercular.

Dr. John Mackenzie divides these neoplasms into three groups: First, the granular hyperplasiæ, the most common, which differ in no respect from ordinary granulation tissue. Occasionally we see this

* Cohen. *Diseases of the Throat*, p. 505.

tissue in quite a prolific state springing from the surface of ulcerations and occluding the larynx to a marked degree, but it usually degenerates before any necessity to open the trachea occurs. These may occasionally resemble malignant growths, but there is a much stronger resemblance between malignant growths and *syphilitic* hyperplasias.

I have already referred to the wartlike excrescences most frequently seen in the interarytænoid commissure. Stoerk* considers them very characteristic of incipient tuberculosis, and says they are connective-tissue hypertrophy in the neighborhood of the congested arytænoids. Lennox Browne† thinks that they are quite as often seen in connection with syphilis, or even in chronic laryngitis. My observation is that they are far more significant of tubercular disease than of syphilis, and I see but rarely cases of simple chronic laryngitis which are accompanied by these.

These papillary excrescences are very closely allied histologically to the laryngeal papillomata found on the vocal bands, and while they are commonly supposed to be caused by the vascularity of a simple catarrh, yet they are found in the anæmic condition of tuberculosis.

A third form of growths which are a manifestation of tubercular laryngitis are the isolated, smooth, round neoplasms composed of tubercular nodules. They appear beneath an unbroken membrane. Dr. John Mackenzie‡ described them in 1882. Dr. J. Pason Clark,# of Boston, has just looked up the literature of the subject. He has collected forty-two cases. He says that of this number the histories of thirteen were not complete, but probably the majority of these were tubercular. In twenty-six of the forty-two the growths were detected during the life of the patient, and of these the lungs were involved in seventeen, and of the nine remaining patients five had phthisis later on, which leaves four cases in which pulmonary signs were not discovered until perhaps a year after the removal of the growth.

These tumors rarely break down into an ulcerative condition, are usually sessile, and the color of the overlying mucous membrane is not much changed. They are more commonly seen on the lateral wall of the larynx than anywhere else.

* Stoerk. *Klinik d. Krankheiten des Kehlkopfes*, etc., Stuttgart, 1880, S. 282.

† Browne. *Diseases of the Throat*, p. 377.

‡ Mackenzie. *Archives of Medicine*, October, 1882.

Clark. *American Journal of the Medical Sciences*, May, 1895.

Clark says that tubercle bacilli can usually be found in them. These growths resemble fibromata and sometimes papillomata, and may be strongly indicative of malignant disease. If they are associated with pulmonary disease we should be very suspicious of tubercular tumors, but the microscope must be depended upon to determine their true character.

It is interesting to note that in Dr. Mackenzie's case of tubercular tumor of the trachea the patient died of carcinoma of the stomach, and that secondary cancerous deposits were found in many organs of the body, but that the lungs were tubercular. The diagnosis in Dr. Mackenzie's case was made with the microscope, and the growth contained an aggregation of distinct tubercular nodules. The mucous membrane covering the growth was unbroken; the case was supposed to be malignant until the microscope showed its true character. I myself have seen two cases in my practice, both of which were demonstrated to be of a tubercular structure by the microscope, one in a man forty-eight years of age, in which the growth sprang from the lateral wall of the larynx. It was as large as a filbert. The patient had advanced pulmonary disease, but no other laryngeal lesion. The growth was unbroken until I removed a section for microscopical examination. It was quite hard. The ulceration caused by cutting remained unhealed, but did not enlarge. The man died in about six months after I first saw the growth.

The second case was in a young woman of twenty-five. The growth, of the size of a large pea, was attached to the left border of the epiglottis. I took it off with a loop guillotine, and the ulceration healed. The patient has intralaryngeal ulcerations and well-marked lung trouble, but she is not failing, and the condition of the larynx is improving.

I have endeavored to mention both the usual and unusual manifestations of laryngeal tuberculosis, and to dwell somewhat upon their respective values from a clinical standpoint. It is hardly necessary to put down here in a tabulated form the distinguishing points, since they can be found so well arranged in the text-books.

I have already emphasized the fact that tubercular infiltration and ulceration, in contradistinction to other lesions of the larynx, are almost always associated with a very anæmic condition of the mucous membrane. Tubercular infiltration is apt to be symmetrically bilateral, while syphilitic lesions, malignant disease, or an idiopathic perichondritis are localized. Not only does tubercular infiltration involve both arytænoid structures, but the swellings are whitish-gray,

while in unilateral perichondritis, non-tubercular, the process is an acute one, and the surfaces are apt to be red and tender.

The amount of pain in tubercular laryngitis is considered a valuable diagnostic point, and it seems to be the general experience of observers that there is more discomfort associated with tuberculosis of the larynx than in any other disease of this location. This pain is specially marked in the swallowing of fluids, but is not present to any great extent except in swallowing, whereas in syphilis there is much less pain at any time, while in epithelioma there is less pain, but it is constant, even when the larynx is not moved in deglutition. A greater infiltration of the tissues is characteristic of malignant disease, and the neoplasm is surrounded by a larger inflammatory areola. Lack of motion of the vocal band on the affected side, without involvement of the crico-arytænoid articulation, is rather characteristic of epithelioma. The amount of stenosis of the glottis is much less in tuberculosis than in syphilis or malignant disease, and seldom requires tracheotomy. Writers always mention the cachexia associated with cancer. The voice is affected differently in tuberculosis and in syphilis. In syphilis it is a rough hoarseness, while in tuberculosis the voice is feeble and aphonic.

Theoretically the tubercular ulcer is very superficial, while that of syphilis is deep. The edges of the tubercular ulcer are not well defined, and merge into the unbroken surface without change of color, while the syphilitic ulcer has a sharply localized periphery surrounded by an inflammatory areola. The destructive process in tuberculosis of the pharynx is slow as compared with that of the tertiary ulcer.

The tubercular ulcer rarely secretes pus, which is common with the syphilitic.

If these points are not enough, the evidences of pulmonary disease in the one case, together with fevers, night sweats, etc., will enable one to make a diagnosis without the assistance of the microscope or iodide of potassium.

Paper.

SURGICAL TREATMENT OF LARYNGEAL TUBERCULOSIS.

By J. W. GLEITSMANN, M. D.

ALTHOUGH the title of the discussion before this association refers to tuberculosis of the upper air-passages in general, I shall confine myself in the part assigned to me to the larynx, and shall mention the pharynx only incidentally, as the surgical treatment of laryngeal tuberculosis has elicited the most widespread interest, and as I take it to be the sense of this meeting to have mainly this subject fully ventilated and discussed.

When we speak of the surgical treatment of laryngeal tuberculosis we generally understand under this term curettement with single or double curettes, and the consideration of these measures will occupy the greater part of this paper. But there are other procedures employed in this affection which have their advocates, and which must not be lost sight of in a complete review of the subject. Surgical treatment, broadly speaking, is either endolaryngeal or extralaryngeal. Endolaryngeal treatment comprises: 1. Incision with knives or properly curved scissors. 2. Curettement. 3. Submucous injections. 4. Electrolysis. 5. Galvano-cautery. Extralaryngeal measures are laryngotomy with excision of the diseased part, extirpation of the larynx, and tracheotomy. Intubation also has been performed for laryngeal tuberculosis.

To my knowledge, no attempt has heretofore been made to collect the literature on these different subjects. When I have endeavored to do so, I do not lay claim to any completeness of the data furnished, but I thought a list of these quotations would be of sufficient value to have them appear in an appendix to this paper; besides, quite a number of interesting data have been found which deserve not to go unnoticed. I shall mention here only a few instances.

The first attempt at surgical treatment was made as early as 1869 by William Marcet, who made punctures into tubercular infiltrations, but whose work did not elicit sufficient attention till Moritz Schmidt published his method of operating in 1880. Another instance refers to extirpation of the larynx. As we all know, the late Billroth was the first who extirpated the larynx for carcinoma on the 31st of December, 1873, which operation is described by Gussenbauer in the *Archiv*

für klin. Chirurgie, 1874. But Pinçonnat quotes in his brochure *De l'extirpation du larynx*, Paris, 1890, the statement of Foulis, made at the International Congress, London, 1881, that P. H. Watson, of Edinburgh, extirpated the larynx of a patient with syphilitic stenosis in 1866, which case was not published at the time. Therefore Langenbeck, who proposed the operation to a patient in 1854, which proposal was declined, is right in saying (*Berliner klinische Wochenschrift*, No. 33, 1875) that the honor belongs to Billroth, who first made the operation for malignant tumors and gave the indications for its performance. In this connection I may state that I have found eight total and seven partial extirpations of the larynx for tuberculous affections in the literature. Of the eight total extirpations, in four the diagnosis of tuberculosis was made before the operation, two were made on account of lupus, two had been diagnosticated as carcinoma; of partial extirpations, five were made for tuberculosis, one for lupus, one for supposed carcinoma.

When we now consider the different operative methods of surgical treatment *seriatim*, it is but natural that curettement should engage our greatest attention. It is the most modern treatment of laryngeal tuberculosis, and is so at variance with opinions previously held that it is not to be wondered at when it finds many opponents up to the present time, this country not excepted. But the number of its adherents increases every year, and only very few who have actually performed curettement have expressed their disapproval. Among seventy publications I have collected I have found only about six writers who speak indifferently or unfavorably about it.

The most rational way to arrive at a fair and unbiased opinion of the value of curettement will be when we consider both sides of the question, and by doing so I hope to be able to refute some objections raised against it. It can not be expected, from surgical treatment of the larynx, that it will directly exert a favorable influence on the almost always present pulmonary complication; but we are justified in speaking of a cure of the larynx when, in spite of the continuance of the pulmonary disease, the laryngeal symptoms have subsided, when the larynx bears a normal aspect, and, furthermore, when no trace of the disease is found at a post-mortem—conditions which are established beyond doubt and are enumerated in the literature. Another argument against curettement is that relapses can not be prevented, an assertion which can not be contested. By curetting the larynx we do not pretend to remove the tubercular diathesis; we can only attempt either to clean a torpid, infectious ulcer and put it

in the best possible condition to cicatrize, or to excise infiltrated tubercular tissue, which sooner or later would break down and lead to vast destructive changes. There is at present no treatment of laryngeal tuberculosis in use which insures against relapses, and for our success we are always dependent on the character of the disease, which is often very treacherous and misleading. But with increased experience and the endeavor to remove all diseased parts till healthy tissue is reached, the relapses with curettement will become less frequent and the results will certainly compare favorably with other methods of treatment.

A further objection is the limitations to which curettement is naturally confined. It is true that we will meet with failure, and ought not to operate on patients with advanced lung disease and hectic, or patients with disseminated tuberculosis of the larynx presenting one large ulcerated surface, nor on such with severe laryngeal stenosis. But it has never been maintained by even the most ardent advocates of the curettement that it is suitable for all cases of laryngeal tuberculosis, and the more precisely the indications are drawn, the better it will be for the propagation of the operation and also for the patient. But the reason that an operation has a limit beyond which its performance is injudicious is no ground to condemn it as a whole, especially when we know that by its execution untold suffering has been relieved and some lives have been saved which otherwise would have succumbed. By the same force of argument we could doubt the propriety of extirpation of the larynx for malignant tumors, as also this operation has its limit and is not in favor with surgeons when the growth has become extrinsic. I myself have in more than one case refused to operate, although urgently requested to do so, when I foresaw the futility of such an attempt. I show you here the arytænoid cartilage spontaneously expelled by a patient who was sent to me for curettement, which, however, I declined.

Two writers profess to have observed outbreak and hastening of the pulmonary process after curettement. Although the possibility of such an occurrence can not be denied, it is just as likely that it is a mere coincidence, and none of the other operators with a large material have met with a similar accident. Finally, objections of lesser importance are hæmorrhage following curettement, and the painfulness and difficulty of the operation. A few cases of severe and also of prolonged bleeding have been described after curettement of the epiglottis and of the ventricular bands, and by some writers electrolysis is recommended for the dense and hard tubercular infiltrations

of the latter. Bleeding can be arrested by a styptic solution of lactic acid and perchloride of iron, and no lasting injury to the patients has been reported. The painfulness of the operation can not be considered an important factor in so serious an affection, the more so as it can be almost entirely obviated by repeated applications of strong solutions of cocaine. A still more effective manner to produce anæsthesia in extensive operations and sensitive patients is the injection of cocaine into the tissue to be removed with a suitable syringe. The difficulty of an operation ought never to be an objection to its execution, so long as the operation is justifiable and within the bounds of technical skill, and when once attempted sufficient experience will soon be gained to master the different manipulations.

After having analyzed the objections raised against curettement I shall speak of the advantages it offers and its indications. Curettement is a rational proceeding and based on sound principles of surgery. Its adoption is entitled to the same consideration as the excision of a tuberculous joint by the surgeon. The latter does not pretend to relieve by his operation the tubercular diathesis or to cure a concomitant pulmonary phthisis, but he is intent to remove a diseased area, a focus of infection, which is a constant drain on the already debilitated patient. The same we are doing by curettement of the larynx, a locality in which, with few exceptions, the morbid affection runs a more rapid course than in other parts of the body, a locality whose lesion is accompanied with more suffering than that of an advanced pulmonary process, and materially contributes to hasten the dissolution of the sufferer. And be it said right here that in the opinion of the majority of operators, as well as my own, curettement in properly selected cases is more effective, quicker in its action, and better in its results than other methods of treatment. But curettement is not only justifiable on theoretical grounds; the improvement or cessation of the laryngeal disease can not but help to influence favorably the pulmonary affection. It will not be doubted that a patient with laryngeal and pulmonary tuberculosis combined has less chances of recovery than one with the latter alone. If we promote cicatrization of a tuberculous ulcer by curettement, if we excise infiltrations containing bacilli, we certainly put the patient in a better position to battle with his pulmonary affection. Therefore surgical treatment ought not to be delayed, as it naturally needs to be less energetic and will yield better results when a smaller area is involved. It is of especial importance to adopt vigorous measures

and to be indefatigable in their execution in cases of primary tuberculosis, which, although rare, undoubtedly occur.

One of the most distressing symptoms of laryngeal tuberculosis is dysphagia, caused by the infiltration of the arytænoid region, and it is this particular feature of the disease which is best adapted for curettement. Being more frequently bilateral than unilateral, the removal of the hard, dense swelling by the Krause-Heryng double curettes can often be accomplished in one sitting without injury to the patient. It is astonishing how quickly the wound made by the operation heals, and if the excision has been thorough the tissues in many cases cicatrize rapidly and assume a normal aspect, showing their natural outlines. The suffering of such patients, due to more abundant nerve proliferation in tubercular disease, as demonstrated by Gouguenheim and Balzer, is so intense, and the relief granted as a rule so great, that arytænoidectomy is in favor with most operators in cases in which otherwise curettement is contraindicated—viz., in active pulmonary disease with hectic. Beyond the benefit obtained in relieving the pain, a much more important object is attained at the same time, since we find that with the disappearance of the dysphagia the patient at once is able to take a sufficient amount of nourishment, leading in the more favorable cases to general nutritive improvement, while even in far-advanced concomitant pulmonary disease the latter follows a much slower course.

Surgical treatment is also followed by improvement of the voice, cough, and respiration—results which are the natural consequences of the cicatrization of ulcerations and removal of obstructive lesions.

When summarizing now the indications for curettement, it is to be recommended—

1. In cases of primary tuberculous affections without pulmonary complication.

2. In cases of concomitant lung disease which is either in the incipient stage or has at least not progressed to softening and hectic conditions.

3. It is best adapted for circumscribed ulcerations and infiltrations of the larynx especially.

4. For the dense, hard swelling of the arytænoid region, the ventricular band, the posterior wall, for tuberculous tumors, and for affections of the epiglottis.

5. In advanced lung disease with distressing dysphagia resulting from infiltration of the arytænoids, curettement is justifiable as the quickest means to give relief.

Contraindications are :

1. Advanced pulmonary disease and hectic.

2. Disseminated tuberculous disease of the larynx, leaving little or no area of healthy tissue.

3. Extensive infiltrations producing severe stenosis when tracheotomy is indicated.

We will also not recommend surgical treatment to nervous, distrustful patients, who lack the necessary perseverance or confidence in their physician. On the other hand, it is often surprising how willingly patients, knowing their precarious condition, submit to the operation ; how cheerfully they permit the necessary manipulation when the physician, guided by the purest motives, devotes his best energies to the relief of the sufferer.

I fully agree with Heryng when he says that the operation may perhaps not become the common property of all specialists, even when approved by them in principle. Although the necessary skill can be easily acquired by experience, the treatment of such patients requires labor, and taxes the energy of the physician beyond the ordinary limit, and often the only satisfaction we derive from our work is the consciousness of having done our full duty.

As to the operation itself, it is not necessary to go into details before an assembly which I have the honor to address. Incisions into the infiltrated tissues, as recommended by Moritz Schmidt, have been followed by disappearance of swelling and ulcerations, as demonstrated by this operator. But the incisions often heal before resorption has taken place, and the observation that tuberculous lesions cicatrize spontaneously, as well as after surgical proceedings, led to the adoption of curettement. Heryng's single curettes are best suited for cleaning and scraping of ulcerations ; Krause's double curettes and Heryng's rotary curettes for excision of tuberculous infiltrations. So far as my experience goes, I have met with no difficulty in excising the arytænoid region or the ventricular bands, but found it a harder task to attack the posterior laryngeal wall and the epiglottis. Subglottic lesions can be operated upon with Scheinmann's forceps, and with laterally bent forceps an attempt may be made to reach also Morgagni's ventricles. As a rule, it is advisable to operate on patients when inmates of a hospital, as they need rest and have better attendance in case any accident—for instance, bleeding—should occur. The after-treatment has to be carried out carefully, and applications of lactic acid or pyoctanin in one- to two-per-cent. solutions have to be made daily till cicatrization is completed, which I saw

taking place in some cases after one week, in others after three to four weeks.

The results of curettement are often dependent upon factors we can not control. Aside from the concomitant pulmonary disease and from the local laryngeal condition, the constitution of the patient and the character of the infection has a great deal to do with the prognosis. Ulcerations which are well defined, not too large in area, give a better prognosis than extended, shallow ulcerations. Dense infiltrations, which are generally localized, are more favorable than œdematous conditions. The smaller the number of tubercle bacilli in the removed tissue the better it is for the patient. Of course, an element of greatest importance is the skill of the operator, his endeavor to remove all diseased infected tissue, and the attention he bestows on the after-treatment.

Only a few operators publish the final results obtained by curettement, and in some instances the data furnished are so meagre and incomplete that they can not well be utilized to judge about the ultimate condition of the patients. The reasons for these shortcomings are manifold; the principal one being probably the difficulty of procuring information from patients after a longer interval. I shall content myself to refer briefly to the statements made by Heryng, Gouguenheim, and Krause, who altogether treated four hundred and fifty-five patients. Heryng operated before 1887 upon twenty-eight patients, two of whom were alive in 1892 and 1894; in eight, who died before 1890, the larynx remained in a healthy condition from one to three years. Of two hundred and seventy cases operated between 1887 and 1894, eighteen were free from laryngeal disease from one to four years. Gouguenheim operated on eighty-six patients from 1893 to 1895. He made fifty-eight arytænoidectomies, of which twenty-five patients affirmed themselves cured and thirty were improved; five of the latter remaining so when seen after one year. In twenty-seven patients the posterior laryngeal wall was operated upon; in seven of these the voice returned in a very clear manner; in ten the improvement was very noticeable. Krause had treated seventy-one patients up to the close of the year 1888, of which number forty-three were cured, or materially improved, or free from complaint. At the date of publication, May, 1889, twenty-eight remained in the same condition as they were when discharged; seven had died; the fate of the remaining eight could not be ascertained.

My own experience is limited to a much smaller number of cases, as I procured Heryng's rotary curette only about a year ago, and pre-

viously used other instruments in but two cases. But the immediate relief the patient felt and the proportionately fair results may justify a short statement: The number of patients operated upon with the double curettes was twelve, all of whom had pulmonary complication. There were two operations for infiltrations of the posterior laryngeal wall alone, one for such with affection of the ventricular band combined; four arytænoidectomies; three arytænoidectomies and excision of the ventricular band, and two of the latter alone. Arytænoidectomy had to be performed a second time on two patients on account of recurring infiltration. One patient died from heart failure, another from his advanced pulmonary disease. Four patients are without recurrence of laryngeal disease from six to ten months, one of whom had affection of the posterior laryngeal wall, another of the ventricular band, and two of the arytænoid region.

Several years ago I adopted surgical treatment with a patient with incipient pulmonary phthisis, who soon afterward left for Europe and has remained there since. I heard accidentally this winter that he was doing well, but as I can not authenticate the report the case must be left out of consideration altogether. But I can refer to one case of most extensive primary pharyngeal and laryngeal tuberculosis which is permanently cured, and which has already been reported at the Berlin International Congress, 1890, and has been examined at different periods by my New York colleagues. I will not weary you with the history of this interesting case, and will only state that the first tuberculous ulcer appeared on the base of the tongue in May, 1888, and that during the summer the left tonsil, the soft palate, the whole lingual surface of the epiglottis, and the left aryepiglottic fold became ulcerated. Most energetic treatment brought the affection to a standstill the latter part of October, and except for a slight ulcer of the palate and left tonsil during the winter of 1888 and 1889, which soon healed under appropriate treatment, the woman has been in perfect health ever since. The cicatrices of the palate and aryepiglottic fold are plainly visible, and were last seen by members of the New York Academy, November, 1894.

It is my full conviction, and I am corroborated in my belief by the opinion of other colleagues who saw the patient at different times, that she would not have recovered by any other means but the surgical treatment. I beg to repeat here what I have said on another occasion, that even if I had never succeeded in relieving another patient, she would nevertheless prove a living example of the benefit

derived from surgical treatment, without which she undoubtedly would have died years ago.

Having already transgressed the limit of the allotted time, I can devote only a few remarks to the remaining chapters. Submucous injections into the diseased epiglottis, the aryepiglottic folds, the arytænoid region, etc., were first made by Krause and Heryng during the summer of 1886, and have been practised more or less ever since. A valuable communication regarding this method of treatment has been contributed by our member, Dr. Major, who advised the injections to be made more frequently and to be repeated at shorter intervals. Several months ago Dr. Chappell, of New York, began submucous injections on an extensive scale, and the results obtained by him so far are certainly very encouraging. While the former operators used chiefly lactic acid, Dr. Chappell injects creosote in an oily vehicle, and has devised an ingenious syringe for this purpose which I have the pleasure of handing you for inspection. The reaction after submucous injections is generally very slight, but they are not altogether free from unpleasant sequelæ, which I experienced in a far-advanced case. The patient was sent to me for treatment of his laryngeal tuberculosis, but the infiltration of the arytænoid region was so extensive that I did not venture to employ curettement. I injected a few drops of lactic acid into the right arytænoid, hoping that when the slough had come off the decreased swelling would allow curettement later on. But the injection had the opposite effect: the tumefaction grew considerably larger, and finally I had to resort to curettement, which, after having been performed a second time, relieved the distressing symptoms of the patient.

I have no personal experience in regard to electrolysis. It has already been mentioned in the text that it is adapted for hard infiltration, especially of the ventricular bands, the excision of which is liable to give rise to hæmorrhages. Although electrolysis is followed by destruction and absorption of the diseased tissue, it has not many adherents on account of the difficulty of manipulation and the length of treatment necessary to accomplish the desired result. Kafemann's and Heryng's instruments can be recommended for this method of operating.

Galvano-cautery, which is advocated by some authors, has still fewer followers at the present day, being superseded by the curettement, which is a more thorough proceeding, quicker in its effect, and less liable to unpleasant reactions.

Of extralaryngeal measures tracheotomy, which was performed for tubercular laryngitis as early as 1834, can not be passed without some remarks. It has been as warmly recommended by some as it has been strongly condemned by others. It can not be denied that quite a number of cases have been reported, especially by Moritz Schmidt, in which not only the urgent symptoms of stenosis have been relieved, but also considerable amelioration of the laryngeal disease has followed the operation, the patients having lived in comparative comfort for a number of years afterward. Therefore, tracheotomy will always retain a prominent place in the surgical treatment of laryngeal tuberculosis, as it is the paramount duty of the physician, if he can not cure, to give at least relief to the patient intrusted to his care.

Literature.

INCISIONS.

1. Marcet, William. *Clinical Notes on Diseases of the Larynx, Investigated and Treated with the Assistance of the Laryngoscope.* London: Longmans, 1869.

2. Schmidt, Moritz. Die Kehlkopfschwindsucht und ihre Behandlung nach praktischen Beobachtungen. *Deutsch. Archiv für klin. Med.*, 1880, vol. xxvi, p. 325.

3. Sokolowski. Przyczynek do leczenia miejscowego t. z. Suchot krtaniowych. (Remarks about the Local Treatment of Laryngeal Tuberculosis.) *Medycyna*, October, 1881.

4. Jurasz. *Bericht über d. Naturforscher Versammlung in Freiburg*, 1883.

5. Gouguenheim. Traitement local de la phthisie laryngée. *Revue génér. de clinique et de thérap.*, No. 6, 1887, p. 65.

6. Wroblewski (Warsaw). Trzy przypadki wygojenia owrzodzen gruzliczych krtani. (Three Cases of Cicatrization of Tubercular Ulcerations of the Larynx.) *Medycyna*, No. 11, 1887.

7. Stoker. *Congrès de la Société franc. pour l'avancement des sciences.* Toulouse, 1887.

8. Heryng. *Die Heilbarkeit der Larynxphthise.* Stuttgart: F. Enke, 1887, p. 117.

9. Jurasz. *Ueber die neueren Behandlungsmethoden der Kehlkopfschwindsucht.* Inaug. Dissert., Heidelberg, 1887.

10. Sokolowski. Ueber die Heilbarkeit und örtliche Behandlung der sogenannten Kehlkopftuberculose. *Wien. klin. Woch.*, No. 5, 1889, p. 94.

11. Stoerk. Ein Beitrag zur operativen Behandlung der Larynxtuberculose. *Wien. med. Woch.*, 1892, Nos. 3, 4.

12. Hajek. Tuberculose Larynxtumoren. *Inter. klin. Rundsch.* 1893, Nos. 37, 38, p. 1387.

CURETTEMENT.

1. Heryng. Ein Beitrag zur chirur. Behandlung der tubercul. Larynxphthise. Deutsche Naturforscherversammlung, 1886. *Deutsch. med. Woch.*, September, 1886.

2. Heryng. *Die Heilbarkeit der Larynxphthise und ihre chirurgische Behandlung.* Stuttgart: F. Enke, 1887.

3. Gouguenheim. Ulcérations tubercul. laryngées. *Soc. de méd. des hôp.*, Paris, May 13, 1887.

4. Wróblewski (Warsaw). Trzy przypadki wygojenia owrzodzen gruzliczych krtani. (Three Cases of Cicatrization of Tubercular Ulcers of the Larynx.) *Medycyna*, No. 11, 1887.

5. Przedborski. Obecne metody leczenia gruzlicy krtani. (Modern Methods of Treatment of Laryngeal Tuberculosis.) *Gazetta lekarska*, Nos. 37, 38, 39, 1887.

6. Heryng. Traitement des ulcérations tubercul. du larynx. *Bull. et mém. de l'Acad. de méd. de Paris*, October, 1887.

7. Heryng. Das Curettement tuberc. Larynxgeschwüre und seine Erfolge. Deutsch. Naturforscherversammlung, 1887. *Allgem. Wien. med. Zeitung*, February 7, 1888.

8. Oltuszewski (Warsaw). Ein Beitrag zur Wirkung der Milchsäure bei Tuberculose des Kehlkopfes. *Deutsch. med. Woch.*, No. 8, p. 146, 1888.

9. Middlemass-Hunt. Local Treatment of Laryngeal Phthisis. *Liverpool Medico-chirur. Journal*, July, 1888.

10. Rosenberg, Albert. Die Behandlung der Kehlkopftuberculose. *Therap. Monatshefte*, July and August, 1888.

11. Srebrny (Warsaw). Gruzlica gardzieli i krtanni. (Tuberculosis of the Pharynx and Larynx.) *Gazetta lekarska*, No. 10, 1888.

12. Sokolowski. O wyleczalnosci i leczenia miejscowem t. z. suchot krtaniowych. (The Curability and Treatment of Laryngeal Phthisis.) *Gazetta lekarska*, No. 35, 1888.

13. Keimer. Ueber Kehlkopftuberculose, ihre Behandlung und Heilung. *Deutsch. med. Woch.*, 1888, Nos. 46, 48, 49, 50, and 51.

14. Beschorner. Die locale Behandlung der Larynxtuberculose. *Gesellschaft für Natur und Heilkunde*, Dresden, November 3, 1888.

15. Sokolowski (Warsaw). Ueber die Heilbarkeit und örtliche Behandlung der sogenannten Kehlkopfschwindsucht. *Wien. klin. Woch.*, Nos. 4 and 5, 1889.

16. Krause. Ueber die Erfolge der neuesten Behandlungsmethoden der Kehlkopftuberculose. *Therap. Monatshefte*, May, 1889.

17. Sedziak (Warsaw). On the Treatment of the So-called Phthisis of the Larynx. *Journal of Laryngology*, June, July, August, 1889.

18. Heryng. La guérison de la phthisie du larynx. Internat. Cong. of Laryng. and Otology. Paris, September 16 to 21, 1889. *Ann. des maladies de l'oreille et du larynx*, November, 1889.

19. Luc. Congrès internationale d'otologie et de laryng. Paris, September 16 to 21, 1889. Note sur un cas de tuberculose laryngée à forme scléreuse. *Ann. des maladies de l'oreille et du larynx*, November, 1889.

20. Luc. Contributions à la question de la curabilité de la tuberculose. laryngée par le traitement chirurgical. *Archives de laryngologie*, No. 3, 1890.

21. Jonquière (Bern.). Die locale Behandlung der Kehlkopftuberc. *Corresp. Blatt f. schweiz. Aerzte*, 1890, No. 9.

22. Bronner (Bradford). On the Local Treatment of Tubercular Laryngitis. *Med. Press*, June 4, 1890.

23. Neumann (Pest). Die Behandlung der Kehlkopftuber. *Pest. Med.-chir. Presse*, Nos. 9, 27, 28, 29, 1890.

24. Luc. Sur le traitement chirurgical de la tuberculose pharyngée. *Bulletin méd.*, August 20, 1890.

25. Gouguenheim et Glover. De la laryngite tuberculeuse à forme scléreuse et végétante. *Ann. des maladies de l'oreille et du larynx*, August, 1890.

26. Fraenkel, Eug. Untersuchungen über die Aetiologie der Kehlkopftuberculose. Virchow's *Archiv*, 1890, vol. cxxi.

27. Sprenger. *Zur Behandlung der Tuberculose des Kehlkopfes.* Inaug. Dissert., Greifswald, 1890.

28. Schaeffer. Ueber das Curettement des Larynx nach Heryng. *Therap. Monatshefte*, No. 10, 1890.

29. Symonds. On the Treatment of Laryngeal Disease in Tuberculosis. *Jour. of Laryngology and Rhinology*, October, 1890.

30. Editorial. The Treatment of Tuberculosis of the Larynx. *Philadelphia Med. News*, October 4, 1890.

31. Simanowski (Petersburg). Zametki po gorlowym i nosowym boljesnjam za 1888–'89 utschebny god. (Report of the Polyclinic for Diseases of the Throat and Nose.) *Wratsch*, Nos. 35 to 40, 1890.

32. Heryng. Kann bei Larynxphthise durch endolaryngeale chirurgische Behandlung eine radicale Ausheilung des Kehlkopfes erlangt werden? *Berliner klin. Woch.*, No. 37, 1890.

33. Gleitsmann, J. W. A Case of Primary Tuberculosis of the Pharynx terminating in Cure. *N. Y. Med. Jour.*, October 11, 1890.

34. Delavan, Bryson D. The Surgical Treatment of Tubercular Laryngitis. *Med. Record*, November 15, 1890.

35. Scheinmann. Die Localtherapie bei der Larynxphthisie. *Berl. klin. Woch.*, November 24, 1890.

36. Heryng. Une guérison radicale de la phthisie du larynx, peut-elle être obtenue par le traitement chirurgical endolaryngé? *Ann. des maladies de l'oreille et du larynx*, January, 1891.

37. Cozzolino. Traitement de la tuberc. laryngée. *Terapia moderna*, February, 1890.

38. Goris. Traitement de la tubercul. du larynx. *Presse méd. belge*, No. 3, 1891.

39. Fraenkel. Ueber Kehlkopftuberculose. *Deutsch. med. Woch.*, No. 9, 1891.

40. Uebermann (Christiania). Om behandling af strubefaering. (Treatment of Laryngeal Tuberculosis.) Meeting of Norwegian physicians. *Inter. Centralb. für Lar. und Rhin.*, April, 1891.

41. Ambler, C. P. The Treatment of Tubercular Laryngitis. *Therap. Gazette*, May 15, 1891.

42. Cuvilier. Phthisie larnygée. *Gaz. des hôp.*, September 19, 1891.

43. Heryng. Fernere Beiträge zur vollständigen Resorptionsfähigkeit tuberculoser Infiltrate. *Berlin. klin. Woch.*, No. 47, 1891.

44. Thompson. Treatment of the Larynx in Consumption. *Cincinnati Lancet-Clinic*, March 12, 1892.

45. Keller, Rudolf. Zur Tuberculose der hinteren Larynxwand. *Münch. med. Woch.*, Nos. 23, 24, 25, 1892.

46. Gottstein, T. *Die Krankheiten des Kehlkopfes.* Wien. Edition IV, 1893, p. 327.

47. Schrötter. *Vorlesungen über die Krankheiten des Kehlkopfes.* Zweite Aufl., Wien, 1893, p. 164.

48. Semon. The Internal Use of Creosote. *Lancet*, March 11, 1893.

49. Helary, Louis. Traitement chirurg. de la tuberc. laryngée. *Thèse de Paris*, 1893. Steinheil.

50. Heryng. Eine drehbare Universaldoppelcurette für endolar. Operationen. *Therap. Monatsh.*, vii. Jahrg., July, 1893.

51. Castex. Traitement chirurgic. de la phthisie laryngée. *Ann. des maladies de l'oreille et du larynx*, July, 1893.

52. Schech. *Handbuch der speciellen Therapie innerer Krankheiten von Penzolat und Stintzing.* Jena: Fischer, 1894. Band iii, p. 197.

53. Semon. A Clinical Lecture on Laryngeal Tuberculosis. *The Clinical Journal*, January 3, 1894.

54. Lermoyéz, Marcel. Deux formes dysphagiques de la tubercul. laryngée. *La Presse méd.*, March 10, 1894.

55. Gouguenheim. Traitement chirurgical de la phthisie laryngée. *Ann. des maladies de l'oreille et du larynx*, April, 1894.

56. Hajek. Gesellschaft der Aerzte in Wien, March, 1894. *Wien. klin. Woch.*, No. 11, 1894.

57. Browne. On the Indications and Limits of Topical Treatment in Laryngeal Phthisis. *Journal of Laryngology*, April, 1894.

58. Capart. Le traitement chirurgical de la tuberc. laryngée. *Ann. des maladies de l'oreille et du larynx*, August, 1894.

59. Bergengrun (Riga). Sieben Fälle von günstig verlaufener resp. geheilter Kehlkopfschwindsucht. *Archiv für Laryng. und Rhinol.*, Band ii, Heft 2, 1894.

60. Massei. Indications et moyens de traitement local dans la tuberc. laryngée. Intern. Congr. of Med., Rome. *Ann. des maladies de l'oreille et du larynx*, July, 1894.

61. Heryng, Theodor. Results of the Surgical Treatment of Laryn

geal Phthisis, based on Two Hundred and Fifty-two Cases. *Journal of Laryngology and Rhinology*, August and September, 1893, April, May, and August, 1894.

62. Gouguenheim. Surgical Treatment of Laryngeal Phthisis. Intern. Med. Congr., Rome. *Journal of Laryngology*, August, 1894.

63. Sokolowski (Warsaw). Surgical Treatment of Laryngeal Phthisis. Intern. Med. Congr., Rome. *Journal of Laryngology*, August, 1894, p. 525.

64. Crossfield. Tuberculosis of the Larynx and Pharynx. *Med. Record*, September 29, 1894.

65. Krieg. Ueber örtliche Behandlung der Kehlkopftuberculose. *Med. Correspond. Bl. d. Wurtemb. ärztl. Landesvereins*, No. 32, 1894.

66. Gleitsmann. Surgical Treatment of Laryngeal Tuberculosis. *N. Y. Polyclinic*, November, 1894.

67. Heryng. Fernere Beiträge zur chirurgischen Behandlung der Larynxphthise, auf Grund von 270 Fällen. *Klinische Zeit- und Streitfragen*, Bd. viii, Heft 2, Wien, 1894.

68. Gleitsmann. The Modern Treatment of Laryngeal Tuberculosis. *Med. Record*, April 6, 1895.

69. Ambler, C. P. Surgical Treatment of Tubercular Laryngitis. *Med. Record*, April 20, 1895.

70. Knight, Charles H. Tubercular Laryngitis. *Internat. Clinics*, vol. iv, fourth series, 1895.

SUBMUCOUS INJECTIONS.

1. Major, George W. The Treatment of Laryngeal Tuberculosis by Submucous Injections of Lactic Acid. *Canada Med. and Surgical Jour.*, December, 1886.

2. Heryng. *Deutsche Naturforscherversammlung*, 1887.

3. Heryng. *Die Heilbarkeit der Larynxphthise*, Stuttgart, 1887.

4. Sedziak. On the Treatment of the So-called Phthisis of the Larynx. *Journal of Laryngology and Rhinology*, No. 6, 1889.

5. McSherry, Clinton H. Curability of Laryngeal Phthisis. *Maryland Med. Jour.*, vol. xxi, 1889, p. 71.

6. Schrötter. *Vorlesungen über die Krankheiten des Kehlkopfes.* Zweite Aufl., Wien, 1893, p. 164.

7. Chappel. The Treatment of Laryngeal Tuberculosis by the Applications and Submucous Injections of Creosote. *N. Y. Med. Jour.*, March 30, 1895.

GALVANO-CAUTERY.

1. Voltolini. Einiges über Phthisis laryngea und deren Operation. *Allg. Wien. Med. Zeit.*, 1884, Nos. 13 and 14.

2. Schmiegelow. Forste Beretning fra commune hospit., etc. *Hosp.-Tid.*, March, 1885.

3. Cahn, M. Tubercul. pulmonaire. Laryngite hypertrophie ex-

cessive de la région aryténoïdienne et sus-glottique. *Ann. des maladies de l'oreille et du larynx*, 1885, p. 207.

4. Astier. *Traitement de la phthisie laryngée.* Paris: T. B. Bailliere, 1887.

5. Lublinski. Tubercul. der Tonsill. *Monats. für Ohrenheil.*, No. 9, 1887.

6. Sedziak. On the Treatment of the So-called Phthisis of the Larynx. *Journal of Laryngology*, August, 1889.

7. Gouguenheim. Papillome et tuberculose du larynx. *Ann. des maladies de l'oreille et du larynx*, 1889, p. 539.

8. Schnitzler. Ueber eine neue Behandlungsweise der Tuberc. des Kehlkopfes. *Deutsche Naturforscherversammlung*, 1889.

9. Gouguenheim. Prolapsus du ventricle de Morgagni et tuber. du larynx. Congrès de laryngologie, Paris, 1889. *Revue mens. de laryngol., d'otol. et rhinol.*, 1889, p. 653.

10. Heryng, Th. O wynikach chirurgiczneys leczenia suchot krtani. (The Results of the Surgical Treatment of Laryngeal Tuberculosis.) *Gazeta Lekarska*, Nos. 1, 2, 3, 4, 5, 6, 8, 11, 1890.

11. Schrötter. A private letter to Heryng. *Berliner klin. Woch.*, No. 37, 1890, p. 843.

12. Schwendt. Bericht über einige chirurgische behandelte Fälle von Kehlkopfphthisie. *Corresp.-Bl. für schweiz. Aerzte*, No. 14, 1891.

13. Sedziak. Kilka uwag w kwestyi stosowania galwanokaustiki w chorobach garola, krtani nosa i uszow. (Remarks on the Application of the Galvano-cautery in Diseases of the Larynx, Pharynx, Nose, and Ear.) *Kronika Lekarska*, 1892, Nos. 5, 6.

14. Srebrny (Warsaw). The Galvanocaustic in the Treatment of Tuberculosis of the Upper Air-passages. *Medycyna*, 1893, Nos. 2, 3, 4, 5.

15. Heryng. Results of the Surgical Treatment of Laryngeal Phthisis, based on Two Hundred and Fifty-two Cases. *Jour. of Laryng., Rhinol., and Otol.*, August, 1893.

16. Gottstein. *Die Krankheiten des Kehlkopfes*, 4th edition, Wien, 1893, p. 328.

17. Schrötter. *Vorlesungen über die Krankh. des Kehlkopfes.* II. Aufl., Wien, 1893, p. 164.

18. Gouguenheim. Surgical Treatment of Laryngeal Phthisis. Intern. Med. Congr., Rome. *Journal of Laryngology*, London, p. 509, 1894.

ELECTROLYSIS.

1. Mermod. Larynx et cocaine. *Revue méd. de la Suisse romande*, 1889, p. 368.

2. Heryng. Traitement des infiltrations tubercul. chron. par l'électrolyse. *Ann. des maladies de l'oreille et du larynx, du nez et du pharynx*, 1889, p. 739.

3. Mermod. Une communication sur l'électrolyse endolaryngé *Revue méd. de la Suisse romande*, January, 1890, p. 51.

4. Scheinmann. Die Localtherapie bei der Larynxphthisie. *Berlin. klin. Woch.*, No. 47, 1890.

5. Capart. Traitement de la tubercul. du larynx. *La Presse méd. belge*, No. 50, 1890.

6. Kafemann (Konigsberg). *Ueber die chirurgische Behandlung der Larynxphthisie*, Danzig, 1892.

7. Heryng. Die Elektrolyse und ihre Anwendung bei Erkrankungen der Nase und des Rachens mit specieller Berücksichtigung der laryng. Tubere. *Therap. Monatshefte*, 1893, Nos. 1 and 2.

8. Heryng. Results of the Surgical Treatment of Laryngeal Phthisis. *Journal of Laryngology*, August, 1893.

9. Castex. Traitement chirurg. de la phthis. laryngée. *Ann. des malad. de l'oreille et du larynx*, July, 1893.

10. Schech. *Handbuch der speciellen Therapie innerer Krankheiten.* Penzold und Stintzing, 1893, p. 195.

11. Tymowski. La valeur d'électrolyse dans la laryngologie. *Revue de laryng., d'otol.*, etc., 1894, p. 304.

12. Gouguenheim. Surgical Treatment of Laryngeal Phthisis. International Medical Congress, Rome. *Journal of Laryngology*, London, 1894, p. 510.

13. Capart. Traitement chirur. de la tubercul. du larynx. *Ann. des malad. de l'oreille et du larynx*, 1894, p. 842.

LARYNGOTOMY, INCISION.

1. Gouguenheim. Traitement local de la phthisie laryngée. *Revue gén. de clinique et de thérap.*, 1887, No. 6, p. 67.

2. Lemcke (Rostock). Beitrag zur Behandlung der narbigen Larynxstenosen. *Berliner klin. Woch.*, November, 1888.

3. Dehio. Primäre tuber. Neubildung des Larynx. *Petersburg med. Woch.*, 1888, No. 16.

4. Schwartz. Trois observations de laryngotomie intercricothyréoïdienne. *Archiv. de laryngologie*, vol. iv, 1891, p. 326.

5. Schrötter. *Vorlesungen über die Krankheiten des Kehlkopfes.* Zweite Aufl., Wien, 1893, p. 164.

6. Pieniazek. Ueber die Laryngofissur auf Grundlage eigener Erfahrung. *Deutsch. Zeitschr. f. Chir.*, xxxvi, p. 342.

7. Sokolowski and Kijewski. Surgical Treatment of Laryngeal Phthisis. International Medical Congress, Rome. *Journal of Laryngology*, London, 1894, p. 525.

TRACHEOTOMY.

1. Valleix, E. L. I. Mémoire sur l'œdème de la glotte. *Mémoires de l'Académie royale de médecine*, tom. ii, 1845. (Operated 1834.) Case.

2. Trousseau et Belloc. *Traité de la phthisie laryngée.* Paris, 1837, p. 95. Three cases.

3. Bricheteau. *Bull. de l'Académie de méd.*, 1840, tom. v, p. 395. Case.

4. Cornaz. *Gaz. hebdom.*, November 26, 1858. Case.

5. Obédénare. *De la tracheot. dans l'œdème de la glotte.* Thèse, 1866, p. 28. Case.

6. Schrötter. *Jahresbericht der Klinik für Laryngoskopie*, 1870, p. 59.

7. Verneuil. *Bull. de l'Acad. de méd.*, 1872, p. 301. Case.

8. Serkowski. Tracheotomy in Laryngeal Tuberculosis. *Allg. med. Central-Zeitung*, 1877, No. 65. Two cases.

9. Ripley. Tracheotomy in Laryngeal Diseases; when and why it should be Performed. *Med. Record*, February 23, 1878. Case.

10. Elsberg. *Med. Record*, February 23, 1878, p. 156. Five cases.

11. Robinson, Beverley. Ulcerative Phthisical Laryngitis; its Nature and the Value of Tracheotomy in its Treatment. *Amer. Jour. of the Med. Sciences*, 1879, p. 407. Eight cases not his own.

12. Duncan. *Amer. Jour. of the Medical Sciences*, 1879, p. 414. Case.

13. Robinson, Beverley. *Archiv. of Laryngol.*, 1880, vol. i, p. 250.

14. Cerné. *Société anatom.*, November 26, 1880. Case.

15. Branon. *Rev. méd. franc. et étranger*, October 27, 1883. Two cases.

16. Gouguenheim. Des indications de la trachéotomie dans la tubercul. laryng. *Ann. des malad. de l'oreille*, 1883, p. 249. Case.

17. Sokolowski. Rozciecia tchawicy przy such. gard. (Tracheotomy in Laryngeal Tuberculosis.) *Medycyna*, 1883. Two cases.

18. Schech. Die Tubercul. des Kehlkopfes und ihre Behandlung. Volkmann's *Sammlung klin. Vorträge*, 1883, No. 230.

19. Lermoyez, Marcel. Végétation tubere. énorme du larynx. *Ann. des malad. de l'oreille*, etc., 1884, p. 183. Case.

20. Schnitzler. Tuberculöse Tumoren im Kehlkopfe. Endolaryngeale Exstirpation und Heilung. *Wien. med. Presse*, 1884, p. 1396, No. 46. Case.

21. Latouche. Phthisie laryngée; l'œdème de la glotte; trachéotomie, guérison. *Revue de clinique médico-chir.*, October, 1884, No. 1.

22. Lohoff. *Ueber Tracheotomie bei laryng. Tuberculose.* Dissert. Würzburg, 1884. Five cases.

23. Gregoire. *Contribution à l'étude de la trachéotomie chez les tuberculeux.* Thèse de Paris, 1884, No. 214. Cases.

24. Pilcher. Tracheotomy in Laryngeal Stenosis of Tubercular Origin. *Annals of Surgery*, February, 1885, p. 151.

25. Cahn. Épiglottite destructive de cause tubercul., etc. *Ann. des malad. de l'oreille et du larynx*, 1885, p. 205. Case.

26. Duhoureau. La phymie laryngée traitée par les eaux sulfureuses

et la trachéotomie. *Revue mensuelle de laryngol., d'otol. et de rhinol.*, 1885, p. 378. Case.

27. Ariza. *Revue mensuelle de laryngol., d'otol. et de rhinol.*, 1885, vol. v, p. 384.

28. Dujardin-Beaumetz. *Revue mensuelle de laryngol., d'otol. et de rhinol.*, 1885, vol. v, p. 384. Case.

29. Gouguenheim. *Revue mensuelle de laryngol., d'otol. et de rhinol.*, 1885, vol. v, p. 384. Case.

30. Briggs, Waldo. Tracheotomy to Relieve Threatened Suffocation from Disease of the Larynx and Trachea. *St. Louis Med. and Surg. Jour.*, September, 1885. Case.

31. Simanowski. *Vratsch*, Nos. 44 to 50, 1885 (Notes of Laryngeal Diseases for 1884–'85). Two cases.

32. Schnitzler. *Wien. med. Presse*, 1885, p. 1495. Case.

33. Jellinek. Ueber Milchsäurebehandlung im Kehlkopfe, Rachen und Nase mit vorzugsweiser Berücksichtigung der Kehlkopftuberculose. *Ctrlbl. für die gesammte Therapie*, Wien, 1885. Case.

34. Sajous. *Lectures on the Diseases of the Nose and Throat.* Philadelphia, 1885, Davis.

35. Fränkel, B. Naturforscherversamml., Berlin, 1886. In *Münch. med. Woch.*, Nos. 14 and 15.

36. Schnitzler. Naturforscherversammlung, Berlin, 1886. *Münch. med. Woch.*, 1889 (?), Nos. 14 and 15. Case.

37. Massei (Naples). Traitement local de la tubercul. laryngée (période ulcéreuse) par les moyens chirurgicaux. *Revue mens. de laryn.*, etc., No. 6, June 1, 1886.

38. Betz. Naturforscherversammlung, Berlin, 1886. *Berlin. klin. Woch.*, No. 45, 1886, p. 787. Two cases.

39. Schmidt. Ueber Tracheotomie bei Kehlkopfschwindsucht. *Deutsch. med. Woch.*, No. 49, 1886, p. 871. Eight cases.

40. Moure. *Soc. anat. et Jour. de méd. de Bordeaux*, 1887.

41. Andry. Trachéotomie dans la tubere. laryngée. *Lyon méd.*, March 12, 1887. Case.

42. Mackenzie, Hunter. The Treatment of Laryngeal Phthisis. *British Med. Jour.*, August 27, 1887.

43. Woakes. *British Med. Jour.*, August 27, 1887, p. 461. Five cases.

44. Schmidt, Moritz. Ueber Tracheotomie bei Kehlkopfschwindsucht. *Deutsch. med. Woch.*, No. 43, 1887. Fifteen cases.

45. Hopmann. *Münch. med. Woch.*, 1889, pp. 230–258.

46. Jacob, Ernest. Treatment of Laryngeal Phthisis. *British Med. Jour.*, December 17, 1887.

47. Hopmann. *Tageblatt der 60. Versamml. deutscher Naturforscher und Aerzte*, September 18–24, 1887.

48. Morelli. *Tageblatt der 60. Versamml. deutsch. Naturforsch. und Aerzte*, September 18–24, 1887. Case.

49. Masucci. Tracheotomy in tuberc. laryngitis. *Rivista clinica*, No. 12, 1887.

50. Blindermann. *Ueber die neueren Behandlungsmethoden der Kehlkopfschw.*, etc. Dissert., Heidelberg, 1887.

51. Chiari. *Erfahrungen auf dem Gebiete der Hals- und Nervenkrankheiten.* Wien, 1887. Cases.

52. Finger. Ueber die sogenannte Leichenwarze und ihre Stellung zum Lupus und zur Tuberculose. *Deutsch. med. Woch.*, 1888, p. 85. Case.

53. Kidd, Percy. Tracheotomy in Laryngeal Phthisis. *Lancet*, March 31, 1888. Cases.

54. O'Kell. A Case of Tracheotomy. *Prov. Med. Jour.*, April, 1888. Case.

55. Mackenzie, H. Cases of Endolaryngeal Removal of Growths from the Vocal Cords. *Edinburgh Med. Jour.*, July, 1888, p. 37. Case.

56. Peake. A Case of Tubere. Laryn.; Tracheotomy performed with Cocaine. *Lancet*, 15, ix, 1888, p. 519. Case.

57. Srebrny, Z. (Warsaw). Gruzlica gardzieli i krtani. (Tuberculosis of Pharynx and Larynx.) *Gazeta Lekarska*, 1888.

58. Keimer. Ueber Kehlkopftuberculose, ihre Behandlung und Heilung. *Deutsch. med. Woch.*, Nos. 46–52, 1888, p. 939.

59. Beschorner. Die locale Behandlung der Larynxtuberculose. *Gesell. für Natur und Heilkunde in Dresden*, 3, xi, 1888. Four cases.

60. Hall de Havilland. On the Use and Abuse of Local Treatment in Diseases of the Upper Air-passages. *Jour. of Laryng.*, September, 1888, p. 344.

61. Kidd. Laryn. Tuber. simulating Abductor Paralysis. *Lancet*, January 26, 1889.

62. Sokolowski. Ueber die Heilbarkeit und oertliche Behandlung der sogenannten Kehlkopfschwindsucht. *Wien. klin. Woch.*, No. 5, 1889. Case.

63. Seifert, Otto. Ueber Tracheotomie bei Laryntub. *Münch. med. Woch.*, 1889, Nos. 14, 15. Four cases.

64. Becker, Karl. Zur Statistik der Laryngofissur. *Münch. med. Woch.*, No. 16, 1889. Six cases.

65. Koch (Luxembourg). Sur la pratique de la trachéotomie chez les phthisiques, indications et contraindications. *Ann. des malad. de l'oreille*, etc., October, 1889. Five cases.

66. Symonds. Treatment of Laryng. Tubercul. *British Med. Association*, Birmingham, 1890.

67. Lennox Browne. *The Throat and Nose and their Diseases.* Third edition, Philadelphia, 1890, p. 422. Cases.

68. Mackenzie, H. Treatment of the Laryn. Tubercul. Meeting of British Medical Association, Birmingham, 1890. *Intern. Centralblatt für Laryngol., Rhinol.*, No. 9, 1891, p. 482.

69. Kuttner. Ueber den Einfluss der Tracheotomie auf Larynxaffectionen. *Berliner klin. Woch.*, No. 35, 1891. Case.

70. Robertson, William. Case of Tracheotomy for Laryng. Phthisis. *British Med. Jour.*, October 17, 1891. Case.

71. Lohoff. *Ueber Tracheotomie bei Laryngealfieber.* Dissert., Würzburg, 1894. Five cases.

72. Schech. *Handbuch der speciellen Therap. innerer Krankheiten.* Penzoldt, Stintzing, 1894.

Extirpation of the Larynx.

TOTAL EXTIRPATION.

1. McLeod. Extirpation of the Larynx. *The Indian Medical Gazette*, Calcutta, 1883, p. 24. *Lancet*, September 15, 1883, p. 455.

2. Bergmann. Sitzungsber. der Gesellschaft prak. Aerzte zu Riga (1884?), reported by Wassermann, Melville. *Deutsch. Zeit. für Chirur.*, Band xxix, 1889, p. 532.

3. Lloyd, Jordan. Extirpation of the Larynx without Preliminary Tracheotomy. *Lancet*, January 15, 1887, p. 114.

4. Gussenbauer, Carl. Casuistic der Kehlkopfexstirpation. *Prag. med. Woch.*, 1883, Nos. 31–34.

5. Hopmann. *Bericht über die 21. Section der 60ten Naturforscherversammlung zu Wiesbaden.*

6. Westbrook. *The Records of St. Mary's Hospital*, Brooklyn, for 1888.

7. Iverson (Kopenhagen). Ueber die Exstirpation des Larynx. Reported by Wassermann, Melville. *Deutsch. Zeit. für Chirur.*, Band xxix, 1889, p. 532.

8. Rydygier. O Wilku pierwotnym krtani. (Primary Lupus of the Larynx.) *Przeglad lekarski*, Nos. 9, 10, 11, 12, 1890.

PARTIAL EXTIRPATION.

1. Gerster (New York). *Med. Record*, April 6, 1889, p. 365.

2. Kocher (Bern). Reported by Wassermann, Melville. *Deutsch. Zeit. für Chirur.*, Band xxix, 1889, p. 532.

3. Péan. Reported by Wassermann, Melville. *Deutsch. Zeit. für Chirur.*, Band xxix, 1889, p. 532.

4. Loeb. Die totale und partielle Extirpation des Kehlkopfes. *Inaug. Dissert.* Bonn, 1891. Two cases.

5. Kocher. Reported by Lanz, Otto. Die Laryngectomien. *Arch. für klin. Chirur.*, Band xliv, 1892, pp. 17, 36.

6. Koch. Reported by Schutter, W. Le nez et la bouche comme organes de la respiration. *Ann. des malad. de l'oreille, du larynx, du nez et du pharynx*, vol. xix, 1893, p. 339.

INTUBATION.

1. Baldwin, T. E. Intubation in Tubercular Laryngitis. *Columbus Med. Jour.*, March, 1890. Case.

2. Rosenberg, A. Ueber Intubation des Larynx. *Berl. klin. Woch.* No. 25, p. 618, 1891.

3. Egidi, F. Intubazione della laryngne nelle stenosi acute e croniche. Congress of Italian Medical Association, August, 1891. *Bulletino delle malattie dell' orecchio, della gala e del naso.* Anno IX, September, 1891, No. 9, p. 204.

4. Massei, Ferdinand. L'intubation du larynx chez les adultes. *Revue de laryngol., d'otologie et de rhinol.*, No. 14, 1891, p. 419. Three cases.

5. Petersen. Beitrag zur Intubation des Larynx. *Deutsch. med. Woch.*, No. 9, p. 187, 1892.

6. Nicolai, V. *L'intubazione della laryngne.* Milano. Cogliati, 1892. Two cases.

7. Hopkins, F. E. Intubation for the Relief of Stenosis in Tubercular Laryngitis. *N. Y. Med. Jour.*, February 27, 1892. Two cases.

8. Knight, Charles H. Intubation for Stenosis of the Larynx in a Boy Twelve Years Old. *N. Y. Med. Jour.*, December 31, 1892. Case.

9. Uchermann, V. (Christiania). *Jour. of Laryngol. and Rhinol.*, November, 1894, p. 779. Case.

10. Lefferts, G. M. Intubation in the Adult. *N. Y. Med. Jour.*, December 9, 1893.

11. Rosenberg. Die Intubation bei Kehlkopfstenosen. Verein f. innere Med., February 28, 1893. *Deutsch. med. Woch.*, No. 35, p. 844, 1893. Case.

12. Rosenberg, A. Die Intubation bei Larynxstenosen. *Archiv f. Laryngol. u. Rhinol.* Erster Band, p. 215. Two cases.

13. Chiari, O. Ueber Intubation bei nichtdiphtheritischen Larynxstenosen. *Wiener klin. Woch.*, No. 27, 1894. Case.

14. Massei, F. L'intubazione della laryngne nei bambini e negli adulti. *Bulletino de la R. Ac. Med. di Napoli.* Anno III, Nos. 1, 2, and 3.

Discussion on the last Three Papers.

Dr. E. L. Shurly, of Detroit, said that he thought the ætiology had been very correctly presented by Dr. Wright. It was necessary to have a correct view of the ætiology in order to properly consider the treatment. He had himself attempted to produce artificial tuberculosis in the pharynx of monkeys by scarifying the pharynx and applying tubercular cultures. In no instance had he succeeded in producing pharyngeal tuberculosis in these animals. Dr. Wright had brought out the fact that if the disease were due to the tubercle bacillus alone, every case, instead of twenty-five per cent. of the cases, should show laryngeal implication, for it seemed

almost impossible that every human being afflicted should not have some abrasion or injury of the mucous membrane somewhere about the mouth or throat. It was therefore evident that there were certain antidotal properties in the secretions about the nose and throat which prevented the invasion of the system by tuberculosis bacilli, or that they alone were impotent to grow in such places.

He believed that there might be a phthisis without a tuberculosis, and also that the fibrous deposits and calcareous degenerations found post mortem did not necessarily indicate tuberculosis, but might be the result of an ordinary broncho-pneumonia that had occurred in childhood. This statement was not made on pure theory, for in two unmistakable instances he had known it to be demonstrated. The two individuals in question he had attended in childhood for severe broncho-pneumonia. One of them had subsequently been killed on a railroad, and the other had died of delirium tremens. A post-mortem examination had been held in each case, and each one had presented all the post-mortem appearances commonly belonging to tuberculosis. Was it possible that he had so erred in his original diagnosis as to confound broncho-pneumonia and tuberculosis?

The speaker said that, as it would be impossible to touch upon all of the agents now used for this disease, he would mention only certain ones. Thus, for local treatment, ice, iodoform, aristol, dermatol, tannic acid, formate of sodium, creosote, creolin, carbolic acid, lactic acid, boric acid and borax, chloracetic acid, chromic acid, chloride of zinc, sulphate of zinc, bichloride of mercury, iodine, chlorine gas and chlorine water, bromine, peroxide of hydrogen, permanganate of potassium, oil of eucalyptus, oil of turpentine, thymol, naphthaline, oil of rosemary, petroleum, lead acetate, the essential oils generally, ethyl bromide, hydrochloride of cocaine, morphine, chloroform, and ether had all been recommended; for the general treatment—iodine, chloride of gold and sodium, creosote, arsenic, strychnine, guaiac, phosphorus, albumin, oil of cloves, oil of turpentine, belladonna, sodium iodide, sodium chloride, cod-liver oil, alcohol, extract of malt, meat extracts, and gavage. For external applications there had been advised capsicum, blisters, croton oil, thapsia, and hot and cold applications. The forms of local treatment might consist of sprays, insufflations, inhalations, and the use of pigments.

If we had a case of laryngeal phthisis in the third stage, with perhaps only slight swelling and functional derangement, it might be better to confine ourselves to the selection of suitable climate and not to resort to any local treatment. By suitable climate he meant one with but few changes and as free as possible from dust. The question of resting the voice varied so in individual cases that this could only be determined in each case by experiment. When the process had extended further and there were solutions of continuity and much pain, there were demanded some measures which would relieve the patient's suf-

ferings. We ought also to endeavor to check the local process, if possible, by the use of antiseptic sprays or gases. In his own practice he had accomplished a good deal by the use of chlorine gas and iodoform. Occasionally he had seen benefit follow blistering of the outside.

The general treatment might be considered as tonic, dietetic, specific, or climatic. Almost all specific methods were disappointing. He had tried all sorts of such methods, and had found iodine the best remedy, though painful. For diminishing the pain incident to the hypodermic injection of iodine, he had tried in vain different solvents. If patients could be persuaded to continue the treatment long enough the results would be almost uniformly good. He had also had good results from the use of creosote and the administration of oil of cloves and cassia, as suggested to him by Dr. Ingals. The oil was usually given at first in doses of from two to five drops. There were individuals who could take large doses of creosote easily, whereas others could not tolerate it in any dose. Gavage could not be used, as a rule, in private practice, but he had found that in hospital practice it often reduced the temperature and improved the general condition very promptly. In giving concentrated nourishment we were apt to rely too much upon animal food. He generally added some bread, tapioca, sago, or other vegetable preparation to the animal broth or extract. This treatment prevented the terrible gastric catarrh and anorexia which were often a source of so much annoyance to these patients, as well as furnishing them with nourishment. It was almost impossible in laryngeal phthisis to employ alcohol very freely, on account of the pain caused by swallowing it. In the later stages of laryngeal phthisis, where the patient could not breathe or swallow without excruciating agony, what were we to do? First of all, as a psychic measure, we should not take from the patient the benefits of hope. We should use a little sodium formate, with eucalyptol as spray, and perhaps cocaine freely to relieve the pain. He had never seen any benefit from tracheotomy in laryngeal phthisis, and he felt sure that in the four cases in which he had resorted to it he had really added to the patient's sufferings. He had used scarification and curetting in a few cases, but without observing any benefit from such means.

Dr. T. Morris Murray, of Washington, D. C., said that he had had some experience in the treatment of tuberculosis of the upper air-passages by surgical procedure. At the meeting of the Laryngological Section of the Pan-American Congress he had reported seven or eight cases so treated. In three of them the patient had suffered from laryngeal and pharyngeal ulceration. One of these had been curetted about two weeks prior to death from exhaustion. The wounds had healed and the patient had experienced decided relief. He thought that in some cases better results could be obtained by the surgical treatment of tuberculosis in the upper air-passages than by any other method with which he was familiar. One of the patients referred to was still alive

and well five years after the treatment. He had had pharyngeal, laryngeal, and pulmonary tuberculosis. The ulcerations in the pharynx had healed after two operations. There had been several operations on the larynx and about a dozen applications of lactic acid.

Dr. Ingals said that he had been much interested in the report made by Dr. Murray some years ago, and just referred to; still he believed that if we treated a thousand cases of laryngeal and pharyngeal tuberculosis by this method and the same number by gentler procedures, it would be found that the larger number of recoveries would be among those treated by non-surgical methods. This statement, of course, he could not prove. He had seen several patients with laryngeal and pharyngeal tuberculosis recover under simple applications, such as those of lactic acid or iodine, without any scraping. He thought recovery was just as prompt as where scraping was resorted to. In his opinion, the cutting away of much tissue was of doubtful propriety in the great majority of cases. Now and then a successful case would be reported, but we heard very little of those that were unsuccessful. As to the statement of slight discomfort experienced by these patients, it reminded him of an eminent surgeon of his acquaintance who frequently gave his patients a half-glass of whisky, but no anæsthetics, and operated while they were, as he expresses it, "in a condition of talking anæsthesia." The surgeon felt no pain. One could quite anæsthetize the larynx with cocaine, but it was not the operation itself that caused most of the suffering, but the pain following it after the anæsthesia had passed off. He believed it was usually better to make these poor people as comfortable as was possible by the use of simple measures than to resort to scraping. For the last two years he had used as a spray in tubercular laryngitis the terchloride of iodine, in the strength of from one to three grains to the ounce, with excellent results. He did not like cocaine as a frequent anodyne, because its after-effect on the nervous system was bad. He still used with much satisfaction an application of carbolic acid, tannic acid, and morphine in glycerin and water. It had seemed to him to give much more relief than any other mixture he had employed. It caused only momentary smarting, and the patient could often swallow with comfort for many hours after the application.

Within the last few years he had sometimes asked himself the question, Are you becoming fossilized? When thoroughly competent younger men made the statement that the bacillus of Koch was not the only cause of tuberculosis, he felt that even though he was an old fossil he was still in excellent company. He had long held and expressed the opinion that we all harbored large numbers of tubercle bacilli, but that unless the general health was at fault there was but little danger of our contracting consumption. He felt that the profession within the next few years would come to accept this view, now so vigorously opposed by the young and enthusiastic bacteriologists.

Dr. Daly said that he had seen a number of patients with laryngeal phthisis recover. One of them, treated some twelve years ago, had recovered sufficiently to contest his just bill for professional services. That patient had been treated with generous diet and terebinthinate inhalations, but he believed that the cure had been chiefly due to the very liberal local use of iodoform by insufflation. He had in mind another patient, a railroad agent, who had recovered under the use of iodoform and iodine pushed to the point of toleration. He had remained well seven or eight years, and had finally been killed in a railroad accident. This man had recovered in spite of alcoholism and other dissolute habits.

The speaker said that he had never resorted to the use of the curette, although he had been interested in the able contribution on this subject by Dr. Gleitsmann. He had never felt that his patients would be benefited by it. In his consumptive wards at the Western Pennsylvania Hospital, in Pittsburgh, he had often been pained at the thought of how comparatively fruitless for therapeutic practical value had been the scientific studies of Koch on the tubercle bacillus. He did not believe those studies had ever shortened the downward course of a consumptive patient; although, undoubtedly, they might have benefited preventive medicine, they had, from public indifference, done so only to a very small degree. He trusted for a better future for them in this direction. He was strongly of the opinion, however regretfully, that from the point of view of the therapeutist Koch's brilliant studies had been of no practical value. While his statistics during the last few years had been somewhat better than formerly, he attributed this improvement chiefly to the systematic and persistent administration of creosote to every patient who had been able to tolerate this drug. Some patients could not at first tolerate it, but by careful watching and gradations of the dose most individuals could be made to take it with advantage. He had some patients now taking with benefit as much as thirty drops three times a day as a result of this process of careful administration.

Dr. W. K. Simpson said that it seemed singular to him that so many physicians denied the causative relation between tuberculosis and the tubercle bacillus, while at the same time their whole treatment was directed toward the destruction of the bacilli, as instanced by the administration of creosote, iodoform, and like remedies.

Dr. Jonathan Wright said that he, with those who had opened the discussion, had taken a fortified place, and were placed on the defensive. He felt that the remarks of Dr. Daly were deplorable. Simply to state the fact that we had not gained anything in therapeutics from the discovery of the tubercle bacillus by Koch was about as good an argument as to say that we had gained nothing from the use of the microscope in the first few years following its introduction. In time, the discovery of the bacillus of Koch would be looked upon as the beginning

of the fight. He wished to express his entire and thorough skepticism as to all forms of treatment of tuberculosis of the larynx. He had tried almost every method that had been recommended. He had used curettement certainly as early as Dr. Gleitsmann, but he had seen so few cases in which it had given any benefit that he had concluded that the results did not warrant the inconvenience and discomfort attendant upon the treatment. We had not yet begun to profit by new discoveries which had been made; nevertheless he felt that these discoveries would be the beginning of our advance in the therapeutics of tuberculosis. Medical men of all ages had been too much disposed to look for some one cause for a given disease. While this desire for simplicity was commendable, it often led us on false scents. There were many cases of tuberculosis, especially in the later stages, which were not attended at all by symptoms referable to the condition of the larynx. A few patients would recover without any treatment, and occasionally one would recover in spite of treatment. The vital objection to all treatment was that it was limited to the initial stage of the disease, and this stage of a disease was a very uncertain period. When we considered that over one half the patients recovered from tuberculosis in the initial stage, it was evident that good results would follow any treatment. The only methods he had not yet tried were the radical procedures of Krause and Heryng, but he proposed to try them. The vast majority of cases, even the advocates of this system admitted, were not suitable for this treatment.

Dr. Shurly said that he did not feel quite so pessimistic as Dr. Daly about the therapeutics of tuberculosis, and especially of the laryngeal variety. He felt that our records during the last few years showed a distinct advance in this respect. The treatment, however, must be begun sufficiently early, although not necessarily in the initial stage. He believed that meddlesome local treatment was mischievous. He relied chiefly on iodine and iodoform for the local treatment, and the formate of sodium as a detergent. It might be objected that powders would act as mechanical irritants, but, whether this was true or not, he had been pleased with the results obtained from the use of iodoform. He fully agreed with those who had expressed the opinion that the tubercle bacillus was not the only cause of tuberculosis. He had adhered to this opinion so long, and in the face of so much opposition, that he was particularly gratified to find others now coming forward and expressing the same view. Tuberculosis was the result of several complex retrograde vital processes. He felt that the therapy of this disease should be followed out on the lines already laid down, and that organic chemistry and biology, working hand in hand, would eventually aid us in solving this highly important and perplexing problem of rational ætiology and therapy. Until this time, our therapeutics could not be scientifically exact. The only difficulty that he had found with the tannic-acid and carbolic-acid mixture mentioned by Dr. Ingals had been

to procure a weak and stable solution. About fifteen years ago, Gilbert, of Paris, had used tannic acid very extensively as a specific for tuberculosis, both locally and internally. He had reported many successful cases. Personally Dr. Shurly had been disappointed with creosote as an internal remedy, although he valued it as an effectual local antiseptic. He had found it impossible to continue the administration of creosote for any length of time in such large doses as were recommended by many practitioners. He had used the oil of cloves as a substitute for the creosote, and when given with a suitable vehicle, like extract of malt, it could be taken in large doses. It did not produce the bad after-effects of creosote, and the systemic effects appeared to be fully as good. We should always remember that in therapy the physiological action must be taken with a grain of allowance, for it must vary greatly in different individuals. For instance, he knew of a man who could only take two or three hypodermic injections of iodine without exhibiting the effect of the iodine, whereas a sister in the same family, suffering from phthisis, could take injections of half a grain for weeks at a time without showing the physiological action of the iodine.

He had not used curettement, for he could rarely find a case in which the disease appeared to be sufficiently localized to warrant him in expecting benefit from this treatment.

The question of the prevention of tuberculosis was now attracting the most earnest attention of the medical profession. The question was, Were we, as a body, willing to indorse the extreme views now held by many eminent sanitarians? Until the sanitarians could show us how many cases of tuberculosis were without doubt due to communication, they had no right to ask us to indorse their theories.

Dr. Gleitsmann said he had to thank the society for its lenient criticism. It had been well known for years that laryngeal as well as pulmonary tuberculosis was occasionally cured spontaneously. It was also known that cures had followed the use of the most varied remedies. Surgical treatment was one of the means of curing some cases of laryngeal tuberculosis. As he had said in his paper, the number of cases suitable for this treatment was quite limited, although perhaps not so limited as Dr. Wright seemed to think. He had narrowed the limits, and had endeavored to avoid being too enthusiastic. What cases were suitable for this treatment he had already described in his paper. He was sorry that Dr. Ingals's remarks could not be refuted by figures. It would be very hard for even a man of vast experience to pick out a thousand cases suitable for curetting. It was also extremely difficult to get data even from old and well-established health resorts in the Old World. In laryngeal tuberculosis we had no figures showing the percentage of cures by any method of treatment. He had understood Dr. Ingals to say that he had seen good results from lactic acid. This was a medicinal rather than a surgical treatment. Where there was a tuberculous tumor which had not broken down, lactic acid was of no

avail unless injected into the mass; it was only of service in cases of open ulceration. In conclusion, he would state that the treatment had been extensively employed by Heryng, and also in France and England. If it was employed in properly selected cases, the result would be excellent, as had been described by Dr. Murray and himself.

Paper.

CYST OF THE MAXILLARY SINUS.

By CHARLES H. KNIGHT, M. D.

IN a discussion on the accessory sinuses before the Congress of Physicians and Surgeons in 1894, Bryan, following the usual custom, divided cysts of the antrum into three varieties: (1) Those due to dilatation of a follicle in the mucous lining of the antrum; (2) those resulting from cystic degeneration of a polyp; and (3) dentigerous cysts, internal and external. The last-mentioned, external dentary cysts, are, properly speaking, not antral cysts, since they are primarily developed outside of the maxillary sinus and reach its interior only by eroding and breaking down its bony wall.

Dropsy of the antrum (*hydrops antri*), or an accumulation of non-purulent secretion within the cavity, due to obstruction of the ostium maxillare, is discarded by the majority of modern observers as a separate pathological condition. In the *Revue de laryngologie*, etc., September 1, 1894, p. 786, a case is reported by Délie under the title Dropsy of the Antrum: Nasal Hydrorrhœa. The title would imply that here the ostium maxillare was not closed, whence the inference that serous effusion may take place into the antral cavity while its nasal orifice remains patulous. In his well-known work on *Surgery* (page 596), Fergusson remarks that in some cases the ostium maxillare becomes closed, and the accumulating *mucus* produces enormous distention of the antrum with great disfigurement. He gives a drawing (Fig. 390) which is supposed to illustrate the foregoing condition in which the tumor ruptured during life.

A very animated discussion of this subject was provoked at a meeting of the Paris Surgical Society by a case of antral fistula consecutive to a *dropsy* of the sinus reported by Quenu. He succeeded in closing the fistula by a rather elaborate plastic operation, which was pronounced by Berger to be entirely useless, the difficulty in these cases being not to close but to keep open the artificial passage from the antrum. Berger affirmed that this and similar cases called

dropsy were really examples of dentary cyst described by Magitot, and that dropsy of the sinus without suppuration was so rare as to be almost unknown (*Journal of Laryngology*, vol. ii, 1888, p. 278). Watson also, in his work on *Diseases of the Nose* (second edition, 1890, p. 173), condemns the designation "dropsy" as being altogether inappropriate, since it implies a false idea of pathology and ætiology.

Many of the cases reported as hydrops of the antrum are believed to be really cystic formations originating in the mucous membrane. On the other hand, a belief in the existence of a genuine dropsy of the antrum has not been abandoned by all, as appears from a paper in the last volume of the *St. Bartholomew's Hospital Reports* (vol. xxx, 1894, p. 237) by W. J. Walsham. In reviewing the points in differential diagnosis he mentions bulging of the walls of the antrum, prominence of the cheek, protrusion of the eyeball, nasal obstruction, and yielding of the anterior wall of the antrum under pressure in the canine fossa as being "well-known symptoms of *dropsy of the antrum.*"

The term is still retained by many others, and probably will remain in our nomenclature to distinguish a watery accumulation in the antrum, of whatever origin, from empyema. Heath, who gives a most satisfactory description of affections of the antrum in his work on *Injuries and Diseases of the Jaws* (p. 168), believes that the name should be discarded, and evidently thinks that all cases reported as hydrops antri were primarily cystic. It would certainly relieve us of much confusion if Heath's suggestion should be adopted.

The frequency of cysts of the antrum is not very great. Luschka, quoted by Heath, found cystic growths in the antrum five times in sixty post-mortem examinations. Heath himself states that no instance of the kind was discovered by Beck in an examination of the antra of thirty subjects. Weber, quoted by Lefferts, in Ashhurst's *International System of Surgery* (vol. v, p. 451), has reported three hundred and seven cases of tumor of the antrum, twenty of which were cystoma. Undoubtedly a cyst may exist for some time without exciting any disturbance. When pressure effects are produced, or the tumor ruptures and its contents escape into the cavity of the antrum and thence reach the nasal fossa, the patient is apt to seek advice.

A study of some of the reported cases is of interest as bearing especially upon the questions of diagnosis and treatment. In the

Medical Chronicle, July, 1894, two cases are recorded by G. A. Wright which in some features resemble my own. In each of these cases the bony wall of the antrum had been displaced and more or less absorbed, and in each some of the teeth were carious. In one there was a history of traumatism, two incisor teeth having been broken by a fall down stairs six years before. The treatment in each was by incision above the alveolus, where the tumor protruded, a clear watery fluid being drained off. The reporter does not venture to choose between a diagnosis of dropsy of the antrum and mucous retention cyst, but suggests that either explanation may be possible. In a case reported by Morales (abstract in *Journal of Laryngology*, etc., vol. i, 1887, p. 186) of tumor of the left cheek, the diagnosis of cyst of the maxillary sinus was based upon the escape of sero-purulent fluid from a spontaneous opening in the neighborhood of the second molar tooth. The sinus was opened under cocaine along the alveolus and a great quantity of fluid escaped. The cavity was drained and dressed antiseptically, and the patient is said to have been discharged cured in about three weeks.

The diagnosis of these cysts is not always a simple matter. Heath cites Fergusson's case, in which preparations had been made to remove the upper jaw for a supposed solid tumor, which was shown to be fluid by a preliminary explorative puncture (*Lancet*, London, June 29, 1850). The same author refers to a case within his own knowledge, "in which a very able surgeon removed the upper jaw before discovering the error of his diagnosis." A parallel case is reported by Marchant (abstract in *Journal of Laryngology*, etc., vol. iv, 1890, p. 164), in which a dentary cyst simulated a sarcoma and was treated by resection of the superior maxilla. A similar error might readily have occurred in my own case, but for exploration with the needle and translumination, the wall of the tumor being so tense and the mass itself so resistant that many who examined it pronounced it a solid tumor.

Cysts of the antrum may be single, as in several interesting cases described by Adams, who was the first to investigate this subject, or multiple, as in specimens portrayed by Giraldès in his prize thesis (1853). The latter observer found cases in which the tumors were very numerous, the entire mucous lining of the sinus apparently having undergone cystic degeneration.

The history of my own case is as follows:

W. H. C., aged twenty-nine years, clerk, has always had excellent health. Eighteen months ago he first noticed a painless swelling of

the gum at the root of the canine tooth of the left upper jaw. It grew steadily without pain or sensitiveness, and the left side of the face became noticeably prominent. The teeth have always been soft and inclined to decay, but never painful or ulcerated. There has never been any nasal stenosis or indication of catarrhal trouble. There is no distinct history of traumatism. The only point recalled by the patient is that in bowling, which he has practised for many years, he has been in the habit of resting the heavy ball against his left cheek. Was the concussion, or possible contusion, thus produced an ætiological factor in the case?

At the time of his first examination the patient complained of nothing whatever, except the obvious deformity caused by the tumor in the left malar region. The mass pushed the upper lip forward, and seemed to reach nearly to the lower margin of the orbit. It extended from the ala nasi across the left side of the face. The skin was unchanged and not adherent. There was no feeling of crepitation or crackling, mentioned by many writers in describing these cases. The sense of fluctuation was so obscure that several who examined it believed it to be a solid tumor. The diagnosis of serous effusion was, however, very beautifully confirmed by the translumination test, and still further by the exploring needle. On raising the upper lip the tumor could be plainly seen protruding in the gingivo-labial fold. The first bicuspid tooth was missing and the second was carious. There was no sensitiveness on percussion or palpation of the alveolus or of the tumor at any point. There was no malformation of the roof of the mouth, and the left nasal fossa was quite normal.

With the expectation of finding a cyst of the antrum, an incision an inch and a half in length was carefully made along the gingivo-labial furrow. What appeared to be a cyst wall was thus exposed. On attempting to dissect out the tumor it was found to be firmly adherent to the bone, and it was finally ruptured. The lining membrane of the antrum seemed to constitute the cyst wall. A section of the membrane as large as a ten-cent piece was cut away for microscopic examination. It was then discovered that the anterior bony wall of the antrum had been almost entirely absorbed, only a thin shell of bone being left near the nose. Upward of two ounces of thin, slightly turbid fluid were evacuated. Digital examination of the interior of the antrum discovered nothing abnormal. There was no exposed, necrosed, or carious bone, and no polypoid degeneration of the mucous membrane could be detected. On the contrary, the membrane seemed thin and closely attached to the bony walls of the cavity. The root of the second bicuspid tooth projected into the floor of the antrum, but was covered by intact mucous membrane. As its crown was badly decayed it was extracted. A director was passed with some difficulty from the antral cavity into the nasal fossa through the ostium. The cavity, having been washed out, was packed with iodoform gauze, and the lip was replaced,

no other dressing being applied. No reaction or disturbance of any kind followed the operation. The gauze plug was removed on the second day and was not renewed. No sign of suppuration occurred. The opening through the alveolus gradually contracted until, at the time of the present report, four months since the operation, it has nearly closed. No indications of recurrence have as yet appeared, and the patient has no inconvenience from his small antral fistula.

In the light of modern pathology this case is reported as one of cyst of the antrum, although it presents many of the clinical features which we might expect in true *hydrops antri.* It was impossible to distinguish a separate cyst wall, and it is difficult to believe that a cyst could have become so agglutinated to the walls of the antrum as to obliterate at all points a line of demarcation between its wall and the lining membrane of the antrum. Its disappearance is explained by absorption, the cyst rupturing into the antral cavity and every trace of the sac ultimately becoming effaced. The character of the fluid found in the cavity supports the cyst theory, since it resembled mucus in no respect, but, on the contrary, was a yellowish, slightly turbid serum. Cholesterin crystals are often met with in the effusion and are considered pathognomonic of cystic formation. In the present instance the examination of the fluid was negative, no cholesterin being found. An examination of the excised piece of tissue by my friend Dr. Jonathan Wright failed to indicate whether it was the thickened lining of the antrum or a cyst wall. His report is as follows: After having been stained, one surface of the specimen was seen to be lined by a thin layer of flattened epithelial cells (three or four rows deep usually). Directly beneath this was a layer of fibrous connective tissue with very few round cells or nuclei; but everywhere a dense crowd of red blood-corpuscles. At one point, near the edge and free from epithelial covering, were a few bundles of striated muscular tissue (?). There were but few blood-vessels and no glands, although in certain places the reaction with hæmatoxylon stain suggested the pre-existence of glandular structure destroyed by pressure. Beneath the dense fibrous layers which constitute most of the thickness of the specimen were areas of loose connective tissue.

Paper.

NECROSIS OF THE MIDDLE TURBINATE.

By A. B. THRASHER, M. A., M. D.

I INVITE your attention in this paper to a much-talked-of subject, but one which I think merits still further study and investigation. The ætiology of all varieties of ethmoidal disease is somewhat obscure, while the treatment is far from satisfactory. I quite agree with Bosworth, that of all the nasal accessory cavities the ethmoid region is most frequently the seat of disease. This assertion is receiving the corroboration of most rhinologists of to-day, when but a few years ago no one would have believed the statement.

The frequency of disease in this region is partly accounted for on anatomical grounds. The situation of the middle turbinate in the narrow apex of the nares, hemmed in on both sides by solid bony walls, leaves little room for inflammatory swelling and causes great pressure when the parts are swollen. In acute rhinitis the lower turbinate is doubtless affected more frequently than the middle, but there is also less danger of implicating the deeper structures or of occluding any of the natural openings of the accessory cavities. When the middle turbinate is inflamed the pressure on the adjacent walls is great, and the openings of the antrum, the frontal and sphenoidal sinuses, and of the anterior and posterior ethmoid cells are easily closed, thus causing a mechanical retention of the normal secretions, which in consequence may lead to a purulent inflammation. Whether the ethmoid is more liable to inflammation in neurotic subjects I do not know; but there is no question but that ethmoiditis lights up a train of nervous symptoms most widely varied in locality and intensity.

While ethmoiditis is a comparatively frequent disease, necrosis of this bone is certainly rare. So seldom is it present that Zuckerkandl (2) declares he has never seen it, and since his investigations were made on the cadaver his opportunities (which he never failed to improve) for seeing every pathological condition were unexcelled. Woakes (3) declares that necrosis is present as a rule whenever there is ethmoiditis. This statement, however, is not sustained by the published (4) examination of his twenty cases, the pathologist only finding true necrosis in two out of the twenty.

I can see no reason why prolonged disease of this bone may not result in necrosis, just as is the case with other bones of the body. The projection of the middle turbinate into a narrow cavity where a small amount of swelling will cause pressure and occasion retained secretions either in the ethmoidal cells or in pockets formed by the unequal contour of the adjoining surfaces—all of which conditions are favorable to the development of violent inflammation, destruction of the vitality of the bone, and consequent necrosis. Two diverse opinions have been advanced as to the causal relation of nasal polypi and necrosis of ethmoid. Woakes (5) thinks that all polypi are caused by necrosing ethmoiditis, and Bosworth (6) theorizes that the pressure of nasal polypi may produce ethmoiditis. But given a case of ethmoiditis and a polyp springing from under the middle turbinate, the conditions are certainly fairly ripe for the development of a necrosis of the middle turbinate. On the other hand, that a polyp may spring from a membrane bathed in the secretions from a purulent ethmoiditis I think quite reasonable, as the analogous condition of aural polypi from a purulent otitis media with necrosis is certainly rather common. I then think that while nasal polypi may be caused by ethmoiditis, yet, on the other hand, necrosis of the middle turbinate may reasonably be caused by the irritation and pressure of polypi.

I can not think that there is a causal relation between cysts of the middle turbinate and necrosis of this bone, yet in one well-marked cyst of the anterior extremity of the middle turbinate I discovered after removal well-marked evidences of beginning necrosis. Cysts of the middle turbinate have been so beautifully described by our able secretary (7) that a glance at his article will establish the serious character of this affection. Whether this condition be the result of a rarefying osteitis or osteophytic periostitis, in either case the conditions are ripe for a true necrosis. Greville Macdonald's theory of these cyst formations is so pretty that I offer it here (8): "The pathological ætiology of cysts involving the middle turbinate is simple enough. The process in all probability begins in an osteophytic periostitis, a condition common enough in this region, and resulting in a general increase of the size of the bone in every diameter. The free margin of the bone being incurved upon itself, the extension inward of this border, from the patholog ical process just mentioned, will bring it in contact, and ultimately in union, with the body of the bone. Thus a cavity may becom

inclosed and sealed at all points by a similar process occurring at the two extremities."

The mucous glands lining the cyst fill it with mucus, which, as is the case with all retained secretions, causes inflammation and a still further osteitis. The subject of ætiology is so interesting that I am prone to dwell upon it longer than our knowledge of the facts will justify. Before entering into the symptomatology I give a brief history of my only two undoubted cases of necrosis of the middle turbinate.

Mrs. McC., of Mount Sterling, Ky., was sent to me in 1891 for a severe pain in the left side of the nose radiating over the entire left side of the face and head. The pain was constant, although subject to periods of exacerbation so regular and so intense as to have called forth a prolonged antimalarial treatment. The left side of her nose was slightly swollen. There was a creamy discharge from the left naris which could be seen flowing down from beneath the middle turbinate. There was present a bad odor, but not such as would lead you to expect necrotic bone. The anterior extremity of the left middle turbinate could be seen much swollen, pushing hard upon the septum and down upon the lower turbinate. The enlarged middle turbinate had much the appearance of a fibroid tumor.

I removed this projecting mass with a cold snare, the portion taken away being an inch long by about a third in its vertical and a quarter in its lateral diameters. The anterior extremity was somewhat bulbous. The mucous membrane was tightly drawn over a spongy bone, and perhaps a third of the outer portion of the bone was entirely dead. The adjacent ethmoid cells were exposed and thoroughly scraped with a sharp curette. There appeared to be no involvement of the other cavities, and with nothing else than a mild detergent spray the parts healed kindly and the bad symptoms disappeared. The amount of pain experienced by the patient was so great that malignant disease was feared, yet the bad symptoms subsided quickly after the operation and had not returned up to within six months ago, when I saw the patient for the last time.

Her attending physician attributed her trouble to a severe influenza which she had about a year before she first visited me.

Mr. B., aged twenty-eight years, consulted me in 1892 for an obstruction of nasal breathing. He suffered severely from neuralgia of the supra- and infra-orbital nerves, for which he had been under medical treatment for about two years with but slight temporary relief. The right middle turbinate presented as a large rounded mass, pushing out the outer wall of the nose and filling the middle meatus. There was but little discharge, and that seemed to come from a hypertrophied lower turbinate on the same side. The left naris was much narrower

than the right, but otherwise normal. I endeavored to remove the growth *en masse* with a cold snare, but the tissue broke down, leaving a large open cavity with exceedingly thin walls. A part of the bony tissue removed bore well-marked evidence of being dead. There seemed to be no connection between the opened cyst and the ethmoid cells.

I have removed more or less of the middle turbinate in a large number of cases, but only in these two have I found by microscopical examination dead bone, so I think it safe to say that the middle turbinate, although quite subject to osteitis, is not frequently necrotic.

The sensation imparted by the probe while exploring this region often causes us to expect dead bone when we only feel rough or denuded bone. In neither of my two cases was the odor of dead bone prominent—not as it is, for example, in syphilitic necrosis. In neither of my cases was I sure of necrosis until I had removed the specimen, and only in the first case did I suspect it. The symptoms which arise in consequence of a disease of the middle turbinate are manifold:

1. Pain, generally referred to the infra- or supra-orbital nerve, sometimes to the eye or orbit (more especially when the ethmoid cells are also involved), and occasionally to the ear. The severe neuralgia accompanying the two reported cases was perhaps the most distinguishing symptom. The pain was more like that involving the ethmoid cells (and in Case I these cells were certainly affected)—intense and prolonged. I have no doubt but that some of the severe facial neuralgias for which exsection of the nerve has been performed would have been better relieved by exsection of a diseased middle turbinate.

2. Nasal discharge, sometimes of exceedingly unpleasant character. The discharge from the cells themselves often irritates the membrane in front, giving rise to a sore and red nasal extremity.

3. Obstruction to breathing and anosmia; but frequently the breathing channel is not impeded even in severe inflammation of the middle turbinate.

4. Obstruction of the natural openings of the accessory cavities, notably the antral, frontal, and anterior ethmoid, occasioning in each case its own train of symptoms.

5. External deformity of the nose only, and when the ethmoid cells are involved the eye is often misplaced by orbital swellings.

6. Various reflex nervous phenomena.

Hajek (12) thinks that "suppuration in the middle meatus is the only positive diagnostic symptom of disease of the accessory cavities. Failing other signs, the cause of suppuration is to be sought for in the antrum. If, after treatment of the antrum and removal of all visible hypertrophies from the middle meatus, suppuration still persists, the frontal sinus is to be investigated. Finally, if pus still flows, the turbinated process of the ethmoid is sounded; if a copious flow of pus follows, we may conclude that the ethmoid cells participate in its secretion. There are no constant signs, however; subjective and objective symptoms are unreliable, and except in cases of abscess of the middle turbinate and of empyema, with orbital fistula, the diagnosis is difficult. The only constant pathological appearance is the presence of polypi or hypertrophies of the middle meatus. These are related to ethmoid disease as cause and effect. Polypi may arise from ethmoiditis; and that polypi may give rise to disease of the accessory cavities can not be strictly proved, but may be inferred."

In these remarks the author would seem to imply that disease of the antrum and frontal sinus are more frequently met with than ethmoidal disease, which is not in accord with my experience. The orbital swelling or pain is generally present in empyema of the cells, while in case of affections of the turbinal process direct inspection will generally reveal the true seat of the trouble.

Treatment.—When the middle turbinate is causing trouble, it is necessary, as a rule, to resort to surgical measures. In conditions of simple inflammation a mild alkaline spray may be followed by relief; or, where there is much congestion, a little cocaine; and in worse cases scarification, or, better still, a deep incision with a narrow sharp-pointed bistoury may be needed. When, however, the case is of long standing, and you have reason to suspect either an osteitis or a necrotic bone, then I advise a prompt removal of the offending tissue. When this can be accomplished by a cold snare I prefer this method. The drill or trephine may be necessary to enable the snare to take hold. Casselberry's (9) sawtooth scissors works admirably well in some instances. The Curtis drill I find very useful in case the bony tissue is very firm, and it can be used at the same time to open up the ethmoid cells and break down the intercellular walls. I hardly think this a proper region for the use of the electro-cautery. The inflammation following the use of the cautery on the middle turbinate, except on the anterior tip, is apt to occasion serious swelling, painful pressure, and great danger of septic in-

fection. The cold steel-wire snare does the work nicely for me in the large majority of cases and has been followed by no serious symptoms.

Mr. Lennox Browne (10) takes exception to Woakes's treatment in the following rather strong language: "With regard to the treatment advised by Dr. Woakes, of removing either the whole or a portion of the turbinal body believed by him to be necrosed, I ask permission to record the statement that I have never yet seen a case in which I have thought it necessary to perform either the major or minor of these procedures, and have yet to meet one, other than specific, with the existence of an actual sequestrum in which the efforts of the surgeon might not be more profitably directed toward the restoration to health of tissues, so important to the function of normal respiration, than to their eradication."

Dr. Knapp (11) in his report of seven cases of ethmoiditis says: "The treatment of these diseases is very important, as spontaneous recovery has scarcely ever been observed, whereas surgical interference is not dangerous to life, benefits almost all cases, and produces permanent perfect cure in many."

It is necessary here to state that the remarks of Mr. Browne refer only to mild cases of ethmoid disease, while in Knapp's cases the cells were involved, and all produced more or less severe ocular symptoms. I must confess that after there is disease of the middle turbinate bone I place but little faith in measures directed toward the restoration to health of these tissues. Neither have I seen such dire consequences follow the partial or complete removal of a diseased middle turbinate, but, on the other hand, relief from the serious symptoms follows rapidly and certainly. It is, of course, understood that here, as in all modern surgery, careful precautions are taken to do the work as near aseptically as possible. On account of the proximity to the brain, the greatest caution should be observed to operate in an aseptic field, and after the operation to keep the parts as pure and clean as possible.

Bibliography.

1. *Transactions of the American Laryngological Association*, 1894.
2. *Anatomie der Nasenhöhle.*
3. *Nasal Polypus*, 1887.
4. *British Medical Journal*, March 12, 1892.
5. *Op. cit.*
6. *Transactions of the American Laryngological Association*, 1891.
7. *Transactions of the American Laryngological Association*, 1891.

8. *Lancet*, June 20, 1891.
9. *Transactions of the American Laryngological Association*, 1891.
10. *British Medical Journal*, January 14, 1893.
11. *Journal of the American Medical Association*, 1893.
12. *Internat. klin. Rundschau*, 1894, xxxi, p. 673.

Paper.

CONGENITAL OSSEOUS STENOSIS OF THE NARIS.

By A. B. THRASHER, M. A., M. D.,

BABY C., aged eighteen months, was brought to me for impaired nasal respiration in April, 1895. He was a well-nourished, handsome boy, but inclined to mouth breathing. There was a muco-purulent discharge from the right naris anteriorly. Digital examination of the vault of the pharynx revealed a mass of adenoids, to which I immediately attributed the nasal trouble. Under chloroform narcosis I removed the adenoids, when with the index finger of my left hand in the nasopharynx I passed a curette through the right naris and ran against an obstruction just before I reached the finger in the nasopharynx.

I could find no opening large enough to pass my small nasal curette. Firm pressure with the curette broke down the partition, which was of thin bone, somewhat thicker near the septum and thinning out to apparently the thickness of an eggshell at the outer wall. This osseous web was seemingly united to the lateral wall at the posterior extremity of the lower turbinate, but was not attached to the turbinate, as could readily be detected by the finger in the nasopharynx. I supposed I had to deal with a congenital osseous synechia, as from the history it had existed since birth.

Discussion on the Last Two Papers.

Dr. S. W. Langmaid, of Boston, said, regarding the last case, that it had been his good fortune to see four such cases. Three of them were known to be congenital. In one of them both nares had been obstructed, probably by bony growths. Both nares were punched through and afterward dilated, and both had remained patent when seen two years or more afterward. Many of these cases, however, had been operated upon quite unsuccessfully. In one of the cases referred to, from the fact that the nose had not been used functionally, it had never attained its full growth, and hence, even though the nostril had been opened, respiration was imperfect. Within the past year he had seen a baby of six months in whom there had appeared to be stenosis. The operation had been postponed for a few months on account of the age

of the child. The condition had been brought to the notice of the parents by the inability of the child to nurse. He had also seen a boy of fourteen years suffering from this condition. It seemed rather strange that he should have seen so many of these cases in a comparatively short time. In the case of the young girl upon whom he had operated the plate had not been bony, but had seemed to be composed of bone and fibrous tissue, and to extend backward about two thirds of the distance.

Dr. Ingals said that, although he had not observed positively congenital atresia, he had seen many cases in which there was partial closure of the posterior nares. This condition, he believed, was often overlooked. In performing the operation for adenoid growths it had been his habit for some years to pass a forceps through both nares before the child came from under the anæsthetic. In quite a large number of cases he had found much narrowing of the posterior nares and in some almost complete closure. Two years ago he had operated upon a little child that had been previously subjected by other physicians to three operations for adenoid growths. The child had not been improved under these operations because these physicians had failed to discover and relieve the obstruction of the posterior nares. It was usually easy to accomplish this with a nasal bone forceps having a smooth and rounded end. By passing this forceps through and separating the handles, dilatation was readily effected.

Paper.

A CYST OF THE NASOPHARYNX AND A CYST OF THE OROPHARYNX.

By JONATHAN WRIGHT, M. D.,

IT is now ten years since Tornwaldt published a paper in which he claimed that sinuses in the naso-pharyngeal mucous membrane were very frequently the seat of chronic inflammation and the origin of the symptoms of postnasal catarrh; that the "pharyngeal bursa" is a normal structure in the nasopharynx; that naso-pharyngeal cysts are very common. Great credit is due to Tornwaldt for drawing attention to these conditions, but his work has unfortunately fallen into discredit because of its inaccuracy.

In the first place sinuses in the naso-pharyngeal mucous membrane are not very common, while naso-pharyngeal cysts are very rare. In the next place, there are a great many cases of naso-pharyngeal catarrh which have for their lesion neither cysts nor sinuses. Lastly the "pharyngeal bursa" has been shown to be

probably not a normal anatomical structure, but the result of chronic inflammation.

I need only remind the members of this association that the explanation of the formation of this "bursa" and of these cysts and sinuses, when they do occur, is that the folds and projections of the mucous membrane in the nasopharynx of infancy and adolescence become agglutinated at their edges or on contiguous sides, thus forming sinuses or closed cavities which in the first case is favorable to the production and discharge of thick muco-pus, and in the second case to its retention, dilating the walled-in space to the proportions of a cyst.

Six years ago I reported * a case of postnasal cyst. Unfortunately, the tissue removed was not examined microscopically. Since then I had not seen another case until last year, when one came to my class in the Out patient Department of Roosevelt Hospital, and was reported by Dr. Lamphear.† Microscopical examination in this case showed that the cyst cavity, as well as its external surface, was lined with pavement epithelium.

* A Cyst of the Pharyngeal Bursa. *Medical News*, September 7, 1889.

† A Cyst of the Pharyngeal Tonsil. *Med. Record*, August 4, 1894.

I may remark here that while normally the epithelium in the nasopharynx is columnar it shades off below into the squamous type, and in many cases of hypertrophied lymphoid growths, even in the vault, the covering is in part or wholly of squamous cells, evidently the result of irritation from secretions or rubbing surfaces. The cyst cavity in the case reported by Dr. Lamphear being lined with squamous epithelium, we may conjecture that the formation of the cavity by inclusion began subsequently to the metamorphosis of the epithelium. Dr. Lamphear says that with the exception of the report of my previous case, referred to above, there is no account of the condition in American journals. This pathological condition, then, it would seem, is of rare occurrence or rarely observed. I am under the impression that the case of cyst of the nasopharynx which I desire to bring to your notice in this paper is not, as were the others, in all probability, an inclusion cyst. Glandular cysts, I think, we can exclude. Glands are exceedingly scarce in the immediate vicinity of lymphoid tissue in the nasopharynx, and, when they are seen, show no tendency to cystic dilatation.

I desire to draw your attention for a moment to a section made transversely through the folds of the mucous membrane in the nasopharynx of a stillborn child, a drawing of which, under a very

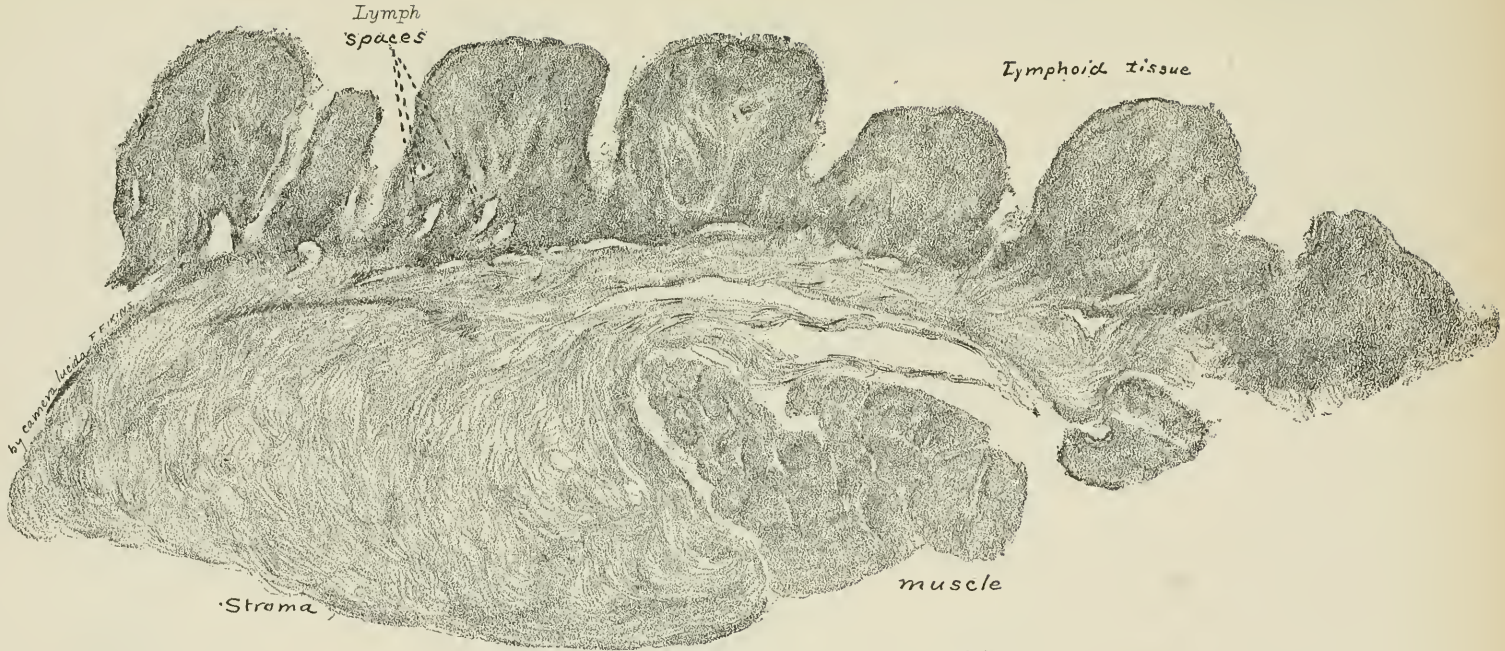


FIG. 1.—Mucous membrane from nasopharynx of newborn infant.

low power, is to be seen in Fig. 1. You see how sharply the lymphoid structures are separated from the underlying stroma. You also see how easily in the inflammation of infancy and childhood

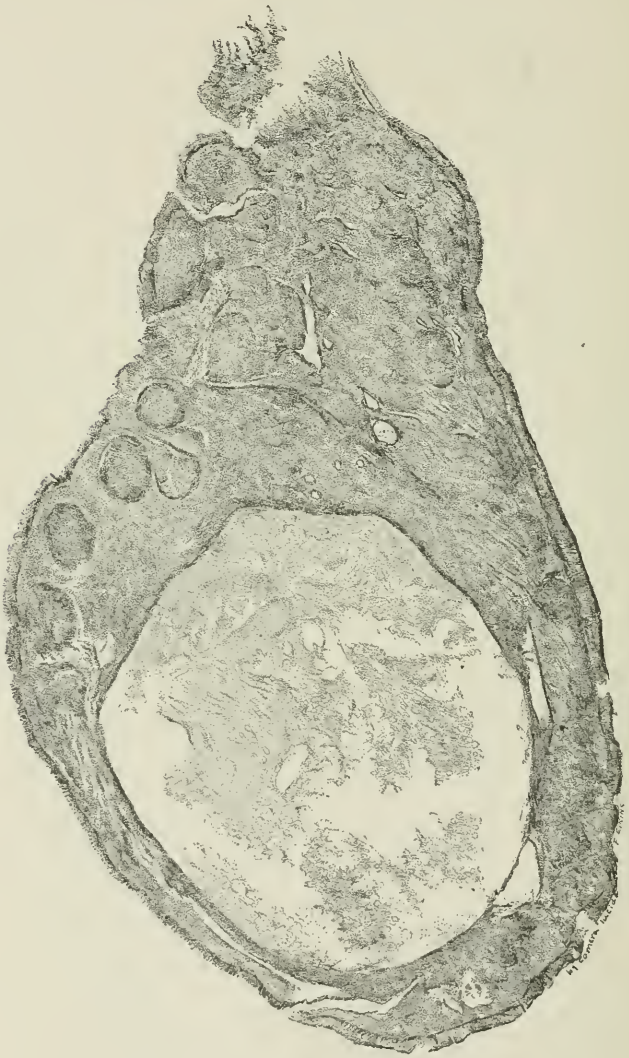
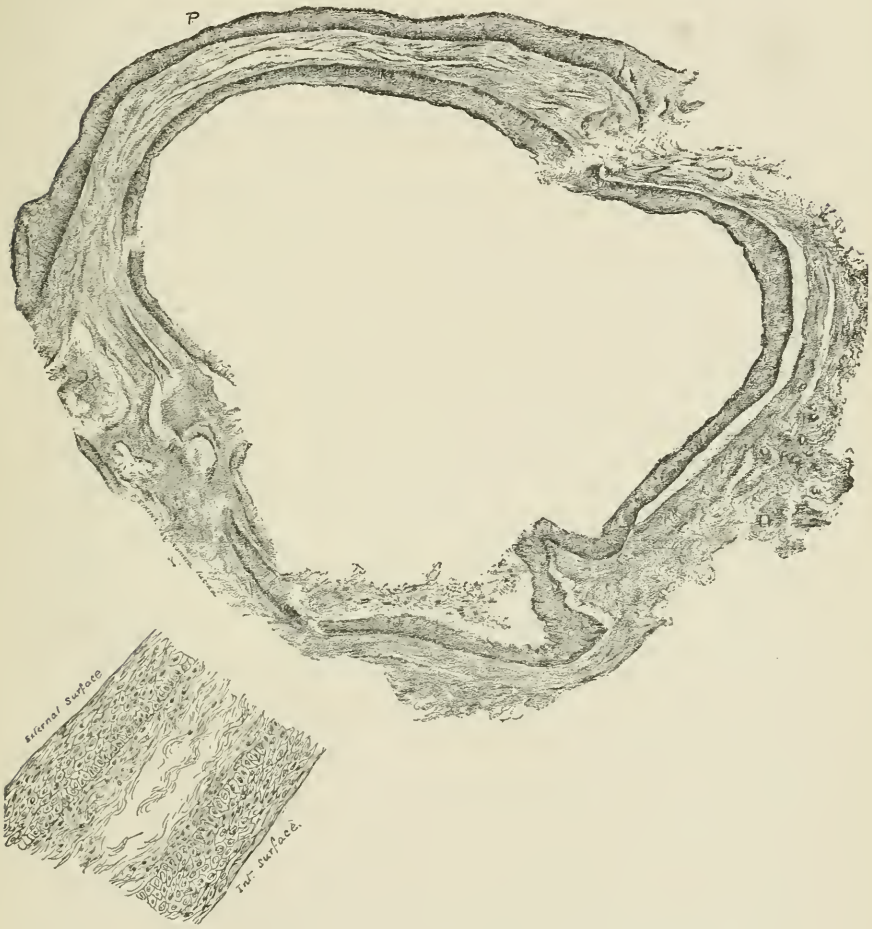


Fig. 2.—Naso-pharyngeal cyst.

the distention and agglutination of these folds may give rise to sinuses and closed cavities, and the latter dilate into cysts by the

accumulation of fluids from the lymphatics and blood-vessels. But there is in this section another point of interest which I believe has a more direct bearing upon the naso-pharyngeal case. Near the base of the folds may be seen oblong spaces, either just where the



IG o-pharyngeal cyst. P, point from which high-power drawing is taken.

ymphoid tissue borders on the connective tissue, or just within the ymphoid tissue, or just within the connective tissue itself. Examning the walls of these spaces with a high power, it is seen that they are lined with a single layer, frequently not complete in this

section, of very thin endothelial cells. These are evidently lymph spaces visible, because they are here not gorged with the round cells which crowd them elsewhere. Now it becomes evident that retention cysts may originate from these spaces becoming closed cavities.

With these preliminary remarks I desire to report two cases—one of a cyst in the nasopharynx and one in the oropharynx:

Case I.—Last year a young colored woman was being treated at the dispensary for an ethmoid trouble, requiring removal of considerable portions of the ethmoidal turbinated bone. A round piece of tissue, about the size of a large pea, apparently lymphoid, was seen in the pharyngeal vault not far from the septum. Its presence apparently gave rise to no symptoms, and there was no other lymphoid growth. It was removed with cutting forceps, and a section of it I show you in Fig. 2. Externally the surface is covered by typical columnar epithelium. A cyst cavity, as you see, occupies about one half a mass of lymphoid tissue. The cavity has no epithelial or endothelial lining at all, though it may have been destroyed by hardening in alcohol. Near one side of the large cavity, however, is an oblong space, such as is shown in Fig. 1. This also has no lining of cells. The absence of an epithelial lining in the cavity, while it is present on the surface, and the small size, would rather militate against a cyst by inclusion, while the absence of epithelial lining and of any other evidence of glands in the vicinity would tend to exclude a glandular origin. The cyst cavity measures three by four millimetres; the other spaces are scarcely visible to the naked eye. I am therefore inclined to think this a dilated lymph space, although I can not be sure of it.

Case II was that of a middle-aged woman, with a family history of cancer, who came complaining of something growing in her throat for the last eighteen months. A small tumor, a trifle larger but of the same shape as in Case I, was seen growing at the base of the right posterior faucial pillar, the region of squamous epithelium. It was smooth and sessile. It was cut off by forceps.

Fig. 3 is a drawing of a section of it. You will observe that it is a cyst, and has thin fibrous walls lined inside and out with squamous epithelium. No glands and no lymphoid tissue. This, then, is probably an inclusion cyst, having its origin in some acute inflammatory condition of the mucous membrane.

The character of the contents of neither of these cysts was recognized. There was some amorphous material in Case I, and in Case II it was fluid and escaped.

Paper.

A TRUE PAPILLOMA OR PAPILLARY FIBROMA OF THE NASAL SEPTUM.

By JONATHAN WRIGHT, M. D.

AT the risk of wearying you, I again bring to your notice a nasal neoplasm in whose histology I have been interested. After many years of expectant observation I have met with a case of nasal papilloma in the sense of Virchow and of the majority of pathological histologists.

In a paper * read before this society several years ago I called attention to the confusion of nomenclature introduced by Hopman in calling papillary hypertrophies and papillary fibromata by the one name of papilloma. Differing as they do totally in pathogenesis, structure, frequency, and usual situation, and having only in common occasionally a similar appearance to the naked eye, there is surely no excuse for the term which has unfortunately been adopted by the majority of authors of recent works in rhinology and by at least one histologist (Birch-Hirschfeld, edition of 1887).

Without making any special search in literature I call to mind only one case of undoubted nasal papilloma reported since my paper was read four years ago.

I allude to the case reported by De Santi in the *Lancet*, December 8, 1894, occurring on the septum in a man of eighty-two, with rodent ulcer of the nose externally.

The history in my own case is as follows:

Mrs. S. G., aged twenty-eight years, a Roumanian, came to the outpatient department of the Woman's Medical College last autumn (1894).

Her family history was negative. She was a healthy woman with the exception of some ovarian trouble. When a child she had had frequent epistaxes, but was not sure from which nostril. For seven years she had felt a valvelike obstruction in the left nostril on forced inspiration, but had remarked no increase in that time. For two months she had been on antisyphilitic treatment with no effect on any of her symptoms.

On examination, the left nostril seemed to be completely stopped anteriorly by a very vascular, soft, papillary, pedunculated mass, freely movable. It was completely removed by the cold snare with only moderate hæmorrhage. It was irregularly globular in shape, flattened by

* Nasal Papillomata. *New York Medical Journal*, December 26, 1891.

the pressure of the ala as it lay in the nose. It was about one centimetre in each of its two longest diameters. Its pedicle was slender and attached to the upper part of the cartilaginous septum at a spot about two centimetres from the columna.

After its removal, inspection showed that this spot coincided with a region which was subjected to the attrition of the upper edge of the triangular cartilage, which forms the ridge known as the plica vestibuli (Zuckerkandl), and which in this case rubbed against the septum when the lower edge of the triangular cartilage was rolled out by muscular action in the dilatation of the alæ nasi during inspiration. The base of the growth was cauterized and as yet there has been no recurrence.

Microscopic examination shows that the pedicle is very slender, and is made up of fibrous tissue which sends off numerous branches covered by columnar epithelium. This columnar epithelium is unchanged in those places where it was protected from the external irritation of air and dust, and the rubbing of surfaces, as in the crypts between the papillæ; but where it was exposed to these influences, as at the ends of the papillæ, the tendency for the cells to become atypical and approximate the type of squamous cells may be noticed in the superficial layers. Everywhere the marked feature of the growth is the proliferation of the epithelium. The stroma is scanty, but carries a large number of lowly organized blood-vessels. In places these are so abundant that the tissue is honeycombed with them. This characterizes nearly all growths of the mucous membrane of the septum behind the vestibule.

Fibroma papillare (true papilloma) of the nasal septum.

There is some serous infiltration of the stroma and there is a moderate number of round cells.

There are places where the epithelium forms digitations into the

stroma, but this is less marked than usual in papillomata of the squamous-celled variety, and where these digitations or scallops occur there is an approach to the squamous type. In places the columnar cells are still provided with cilia. Even with a one-twelfth homogeneous immersion objective it is impossible to make out any stickle cells among the squamous epithelium. Elsewhere,* however, I have shown that these occur in some of the other nasal growths. Their presence simply means that the metamorphosis has advanced to completion.

It will be remembered that this tumor had its origin not far from the normal squamous epithelium of the vestibule, and I am somewhat surprised that the epithelial cells are so decidedly columnar in type as they are. Now, a structure such as this is a rarity in nasal pathology. This is almost the only growth I have observed which had any appearance of a true papilloma out of ten or twelve thousand nose and throat cases seen in the last nine years (I do not include hard warts of the septum near the columna). It is the only one which a microscopic examination has subsequently proved to be a fibroma papillare. I have seen scores of "Hopman's papillomata," and examined microscopically perhaps a dozen. Last year I showed you a section of one and a drawing of the section of another.

In this drawing you will see fairly well the general character of the tumor I have just described, and it is unnecessary for me to repeat the many points of distinction from the inflammatory products mentioned above, upon which I have dwelt in former papers.

Since this paper was written, I have examined histologically a similar tumor from the septum of a five-year-old child, sent to me by Dr. Arrowsmith.

Discussion on Papers of Dr. Wright.

Dr. H. L. Swain asked if there was any tendency for this papilloma to recur.

Dr. Wright replied that he had removed the growth last fall, and that up to the present time there had been no evidence of recurrence.

Dr. Swain said that he had during the last year made sections of a true fibroma papillare of the nose. This case was especially interesting because it had shown a strong tendency to recur in the adjacent tissues after it had been removed. Sections of recurring laryngeal papilloma and sections of this papilloma could not be distinguished if examined side by side. This papilloma had recurred in different situations at intervals of a few months, and he had finally lost sight of the patient.

* Some Remarks on the Structure of Œdematous Nasal Polypi. *New York Medical Journal*, November 4, 1893.

Another physician now had under his care a patient answering this description, and he was still removing recurrent growths from different parts of the nose.

Dr. Newcomb said that, bearing on the rarity of cysts of the nasopharynx, he desired to say that he had removed one about a week ago. The specimen was in alcohol and had not yet been examined. The growth had had a hard feel, and had been removed by the cold snare without any hæmorrhage whatever. After the removal of this mass he had found still another. This had led him at first to suppose that only a portion of the mass had been removed, but examination on the following day had shown that the snare had either slipped over one growth or else over one lobe of a single growth. The true condition had yet to be determined.

Dr. Langmaid said that he had removed a few months ago what might be called a recurrent fibro-cystic growth of the pharynx. The growth had been seized with a strong forceps and violently torn away. In a few weeks it had reappeared. About six weeks ago he had removed it for the second time. It had again recurred, and a third operation would be done soon. The microscopical examination showed that the two tumors already removed were fibro-cystic, and that the tissues were quite œdematous. It was the first cystic growth that he had ever seen in the nasopharynx. At first, on account of its great density, he had supposed he was dealing with the ordinary nasopharyngeal fibroid polyp. The growth had extensive attachment to the septum and the vault of the cranium, which had made it impossible to include it in a wire snare. There had been no hæmorrhage.

Dr. Wright said that he had no doubt that the papilloma in his case would recur. He had simply meant to call attention to the fact that many of these cases had not been reported. He did not doubt, however, that they were comparatively frequent, and had been overlooked. The description of Dr. Langmaid's case had at first led him to think that the growth was a fibro-sarcoma, but the absence of hæmorrhage was opposed to this view. The recurrence might have been due to a partial removal only of the cyst wall.

Paper.

THE RELATION OF VASO-MOTOR DISTURBANCES TO DISEASES OF THE UPPER AIR-TRACT.

By F. H. BOSWORTH, M. D.

THE first stage of an inflammatory process is dilatation of blood-vessels as the result of vaso-motor paresis followed by the escape of liquor sanguinis. Inflammation, however, is a progressive phenomenon and not usually stationary. By clinical observation we

are made familiar with cases in which the apparent lesion constitutes this first stage of inflammation. It is a stationary condition and not progressive. We have been taught to regard these manifestations as the result of vaso-motor disturbances. They manifest themselves in the air-tract in the form of hay fever, nasal hydrorrhœa, asthma, etc. We also find them in the skin and other organs. These disturbances, furthermore, are usually circumscribed in extent, invading a limited area of the integument or of the air passages. In the search for a reasonable cause for the development of these vaso-motor disturbances we are largely compelled to theorize.

One of the earliest and perhaps most universally accepted theories is that they are reflex in character. As I have repeatedly argued before this association, I think that as we become more familiar with the diseases in the upper air-tract we will in many cases be disposed to abandon this somewhat indefinite and obscure term reflex and adopt the theory that many of the so-called reflexes are the direct result of morbid action upon either the nerve centres or the tissues involved in the inflammatory action. I speak, of course, now only with reference to the vaso-motor disturbances observed in the air-passages. The early investigations of Ludwig and Thiry seem to indicate that general vaso motor control is presided over by a single centre in the medulla. The later researches, however, of Goltz, Vulpian, and Schlesinger have shown that there are secondary centres of vaso-motor control found in the gray matter of the spinal cord as far down as the lumbar region, which exercise control over limited regions of the body.

That these centres are capable, however, of independent reflex action in the same sense that the ordinary nerve centres of the spinal cord are known to be, has not, so far as I know, been demonstrated by physiological experiment. Nor do I think that clinical observation of these processes warrants us in assuming this. I therefore would take issue with the view that vaso-motor disturbances are always reflex in character. A favorite theory maintained by many of us in times past is that an ordinary chronic inflammatory process in the mucous membrane of the upper air-tract, with its attendant vascular plethora, so far weakens the blood-vessels that they are thus rendered more susceptible and thus become the seat of vaso-motor weakness. That this is true I do not question, for it is a view that I have long maintained; but this does not serve to explain these manifestations. The local inflammatory process is the contributory cause and not the exciting cause.

A third explanation remains, and that is that vaso-motor disturbances are really the result of some localized morbid process acting directly upon the vaso-motor centre in the medulla or upon some of the secondary centres distributed in the gray matter of the cord. This is a view first made prominent, I think, by Schmiegelow in his admirable monograph on asthma, in which he maintained that the true source of this affection was to be found in some morbid condition of the medulla oblongata, although he leaves the question in something of obscurity as to what this special localized condition may be.

I do not know that I can throw much light on the subject, and yet in a review of a large number of cases of ethmoid disease—something like a hundred and fifty—which have been under my personal observation, I have found that between ninety and a hundred showed marked evidences of vaso-motor disturbances in the air-tract, either in the form of hay fever, asthma, or nasal hydrorrhœa. Here we have a simple explanation of the occurrence of these so-called neuroses of the air-tract, without entering upon the obscure question of reflex action. The ethmoid bodies, as we know, are composed of a mass of honeycomb cells, separated from the brain by a very thin partition of bone, and, when they are the seat of inflammatory action, the first and most prominent condition consists of intracellular pressure. This pressure is apparently exerted in every direction, crowding upon the os planum and producing the distressing eye symptoms with which we are familiar; crowding upon the base of the brain and producing that curious symptom which has been termed aprosexia, one of the most common and constant symptoms of the disease. That this is due to certain disturbances in the circulation of the brain, and possibly to some slight pressure upon that organ, is shown by the fact that the function of the brain is notably impaired. These patients complain that they can not transact business in a clear-headed way, and describe a sensation of a blanket resting over the brain which interferes with its functions.

As numbers of instances in my own experience have shown, the removal of this intracellular pressure is immediately followed by the greatest relief. The other point toward which this intracellular pressure is exercised is toward the nasal cavity, the point of least resistance, and here we find the ethmoid cells burrowing, as it were, into the middle turbinated bone or crowding it forward into the nasal cavity, forming that large shell like mass which we recognize as characteristic of ethmoid diseases. The surface of this protruding mass

is usually covered with myxomatous tissue, and in other cases this same tissue is crowded out beneath the body, forming the ordinary nasal polypi. Here again we confront an old theory that nasal polypus is the cause of hay fever and asthma by reflex action. This may possibly be true in certain cases.

But I believe a more tenable theory to be that the primary cause both of the polypus and reflex disturbances is to be sought in the inflammatory process involving the lining membrane of the ethmoid cells, and that this results in the disturbance of the circulation at the base of the brain and the medulla together, with direct pressure upon either the primary or secondary vaso-motor nerve centres there found.

Discussion.

Dr. William H. Daly opened the discussion with a paper in which he said that the upper air-passages might well be considered the gateways of life. The nose and throat, through their apertures, the mouth and nares, were the sensitive portals through which entered the air we breathed. It was through the sensations telegraphed from these points to the sensory and vaso-motor centres in the brain that the subject was informed he was in the presence of noxious gases or offensive odors. It was in the nares that we had the alarm sounded by these silent sentries, the nerve peripheries, that there was an onset of a coming cold, whether the enemy was the pollen of plants or other irritating dust, or the sudden change of atmospheric temperature or moisture.

Even if the body surface had first been attacked, here the premonitory tickling and sneeze made us aware of coming danger, and we closed the window, got in out of the draught, drew near the fire, or donned our robes. It was all the same, the premonitory warning most heeded and feared was that which came to our senses through the nose. So possibly the common English expression, "paying through the nose," might be based upon the common liabilities to be met in discomfort and physical suffering, the first mortgages of which were recorded and made a permanent lien upon our physical property from the moment we ignored the notice given us by our first sternutatorial act.

There were too many incontrovertible facts connected with both vaso-motor disturbances and their basic cause in the respiratory tract to give rise to doubt that they were not pre-eminently worthy of our consideration; they justly gave us much substantial though difficult grounds for investigation. And while in doing this we might sometimes appear to "thrash over old straw," yet in the thrashing of it we should find more than mere chaff for our pains; we should here and there find a grain of sound scientific pathological truth that, properly cultivated, would yield

a harvest full of ripe and rich substance for the benefit of the health of humanity.

In these days of *fin-de-siècle* medicine the most striking and valuable advances were incontestably being made in the smaller details and the specially limited fields of our art and science. We therefore from the present standpoint believed we had much justification in making our business the subtle malfunctions of the nasal organ, which had popularly so often been accused of putting itself into every sort of business not strictly and normally its own, and in this possibly popular animadversion had not been altogether wrong.

At all events, there were some non-æsthetic figures and functions of the nose that had always, to his mind, needed reforming, and he had therefore made it much of his business of life to do what his limited ability permitted in that direction, and he had had no little satisfaction (and as well sometimes alarm from the ill-advised work of enthusiasts) in knowing that the school of intranasal medicine and surgery in America was a school which he had had much to do with founding and forming. This was a fact scarcely doubted by the men who had been working in the field from the first appearance of his earlier papers on affections of the nose, as previously to the appearance of those essays most of the literature had been that of laryngologists, and on subjects pertaining to laryngology.

It was worth while to note the foregoing, since we had springing up otherwise bright men now and then who seemed yet to have not heard of so minor a matter as the speaker's teachings to the profession in 1882* and subsequently concerning nasal neuroses, especially relating to hay fever.

True, Voltolini's and Porter's cases had appeared previously on a kindred subject, but their teachings had been sleeping in the tomb of the Capulets. And in so great a city as London in 1878, with its eminent teachers Mackenzie and Browne, men had scarcely been making an intra-rhinoscopic examination. And he knew he should be pardoned for any apparent self-satisfaction he might express, that to be supported by such men in America as Bosworth, Roe, Ingals, Mackenzie, and hundreds of others, and in Europe by innumerable hosts, and to find the practice he had inculcated in 1882 to be now the advanced and well-tried and efficient practice of the scientific medical world, was calculated to afford him much pleasure and satisfaction.

But to recur more specifically to the discussion in hand—The Relation of Vaso-motor Disturbances to Nasal Disease—we were taking up a question that was apparently, if not really, present as a factor in a large part of nearly all the conditions of the nasal interiors we had to deal with, as well as some we had little or nothing to do with.

* Hay Asthma and Naso-pharyngeal Catarrh. *Archives of Laryngology*, vol. iii, No. 2, April, 1882.

The act of blushing was, in fact, a sudden shock to the vaso-inhibitory function of the vaso-motor nerves; and the dreaded red nose of innocent puberty and adolescence, as well as that induced by the alcoholic industries, might or might not be a local partial paralysis or the reflection of a remote irritation.

In fact, every act or change in the motility of the non-striped muscles of the arterial system, of the nares especially, constituted a disturbance, and we therefore should have (in his opinion) had for the title of the discussion to-day "the relation of *abnormal* vaso-motor disturbances to diseases of the upper air-tract"; but it was and ought to be understood that we were dealing for the chief part with the pathological conditions of the parts, and not with normal functions or disturbances.

He had for years been cognizant of the fact that abnormal vaso-motor disturbances and other diseased and abnormal conditions were in themselves both cause and effect. On the one hand, vaso-motor abnormities might in a given instance be primarily the cause of and inductive of local structural disease, as in another case a structural abnormity might be a primary cause producing a local vaso-motor malcondition that would react and cause suffering from such abnormal function, intensified by the local lesions which gave rise to it—either from excess of inhibition of vaso-motor function causing, for example, on the one hand, atrophic disease of the mucous membrane, or *per contra* a partial local paralysis of the vaso-inhibitory function, allowing too much blood to become static in certain localities and deposit its nutrient material as sediment was deposited in the eddies and sluggish portions of streams; we had in this event as a result hypertrophies, various hyperplasiæ, or, what was also common, a baggy, boggy local condition so often seen, especially in the nares, the temporary disappearance of which was so prompt and striking upon the local action of cocaine used previous to the various operative procedure which we resorted to within the nares.

There was yet another condition well illustrated by Dr. W. C. Glasgow,* of St. Louis, wherein the cavernous bodies of the nasal mucous membrane became infiltrated with escaping white corpuscles and liquor sanguinis. This condition we had all seen often in practice—viz., pallid mucous membrane, leaking sero-mucus, and blocking up of the nares with its pale flaccid sacs, especially when the patient was in the recumbent posture. The speaker had repeatedly found this condition as a concomitant of general neurasthenia, and whether, as Glasgow had said, it was due to a state of spasm of the minute vessels supplying the arteries through nerve irritation or not, it remained apparently that there was a recurrent congestion nevertheless either of normal blood or of some of its normal constituents separated from it.

* Vaso-motor Disturbance of the Nasal Membrane. *Transactions of the American Laryngological Association*, 1885.

There was also an alteration in the tone and form of the tissues besides an abnormal vaso-motor disturbance, which was a *sine qua non.* And this condition might be considered one of the local pareses of motility with as much reason as Glasgow considered it due to an increased tone of the vessels caused by an augmented action of the vaso-constrictors.

Dr. S. Weir Mitchell had aptly put it that the brain and nervous system, and, the speaker might add, especially the organic nervous system, under stress, might be likened to a thoroughbred horse which, being most highly strung, was apt to be unduly active, and in response to the spur and whip to display an apparent activity which was really the expression of past or present exhaustion.

And Dr. Roe, our president, had epitomized the question tersely * in saying: "In many cases the nose is the objective cause, and in many cases, no doubt, the subjective cause," and cited an illustrative case of a man who had consulted him for suspected pulmonary disease, complaining of pain in his chest. A careful investigation had revealed sound lungs, but in the nares there had been found an inflammatory condition with exostoses, a cure of which had relieved the pulmonary pain promptly.

The conditions of the nose due to reflex irritations and *vice versa* were more far-reaching than those of the air-passages, and if the instances of hay asthma and catarrhal and spasmodic asthma were left out of the question, nevertheless, clinical history had so rapidly grown upon the sure foundations laid for it in intranasal medicine and surgery as to make it impossible for us to ignore the facts given us, even allowing a large margin for enthusiasm, a sentiment he had never indulged in on this question.

He referred to neuralgias, digestive disorders, etc., that had been incurable until the interior of the nose had been put into a healthy and normal condition.

But, as this discussion was limited to the air-tract, he did not feel permitted here to give cases in his possession that afforded illustrative proof of the reflex irritative effect of intranasal disease upon other structures and organs of the body than the respiratory tract.

I might here be permitted to say that he had never had any reason to retract what he had hoped years ago for the treatment of hay fever and forms of catarrhal and spasmodic asthma by surgical procedures. His statistics had rarely fallen below sixty-three per cent. of cures in catarrhal and hay asthma, and about forty per cent. in spasmodic asthma, and one of the most successful practitioners in this, or for that matter in any country, scarcely ever failed in making cures, except when he was unable to get the consent of the patient to submit to a correction of intranasal deformities and abnormities present, and a local

* *Transactions of the American Laryngological Association*, p. 30, 1885.

cure of the constantly concomitant rhinitis and other pathological conditions.

Vaso-motor disturbances were the essence of all conditions in one form, manifestation, or another of diseases of the upper air-tract, and indeed it was in the mechanism of asthma in its varied forms that normal vaso-motility was most severely put to the test.

He had recently met a prominent medical man of Baltimore, who had had his last and recent attack of hay fever entirely limited to the tissues of the palpebra, and the case had exhibited a condition of disturbance of the local vaso-motor system almost exclusively.

In the beginning vaso-motor disturbances were always of an irritative nature, and later on, when the paths for the transmission of motor impulses became involved, paresis or complete paralysis of the blood-vessels might ensue, or the case might continue in the local irritative stage for years, and be combined with sensory disturbances—such as formication, anæsthesia, neuralgia, or a sense of stuffing in the nares when there was really a fair and sufficient lumen.

These were conditions that from long observation had become to him familiar figures in the functional pathology of the nares, and he had no doubt also had been repeatedly subjects of observation on the part of his esteemed colleagues, who had done him the honor to listen to this, on his part, necessarily brief discussion.

And now, finally, to sum up his opinion:

a. Abnormal disturbances of the vaso-motor function, or disease of the upper respiratory tract, might either, one or the other, be primary or secondary.

b. Both, when established, might be coactive and progressive.

c. The surest and quickest cures were those in which surgical interference found a proper election.

Dr. Mulhall said that the nose presented two distinct clinical pictures of vaso-motor rhinitis: one, in which the membrane was pallid and weeping, and the other, in which the mucous membrane was succulent, soft, red, and hyperæmic. We need not always look to the nose for a cause of these vaso-motor disturbances. In an article published some time ago on Diet and Exercise in the Cure of Chronic Inflammation in any Portion of the Body, he had given the following instructive example: A policeman had come to him with the pallid form of vaso-motor rhinitis. He would wet from five to eight handkerchiefs a day with the fluid from the mucous membrane of the nose. The true cause of the condition had not been discovered, and hence treatment had not relieved him. Inquiry had shown that the man had been a mounted policeman for many years, but had recently been transferred to clerical duty in a hot station-house. He was at this time about fifty years of age. One would expect that the abandonment of horseback-riding which had been carried on for so many years would result disastrously to his general health. He was restored to the mounted force, and with-

in a month all of the disagreeable symptoms had disappeared without any treatment of the nose whatever. He had known some of these cases to last for years, and to be characterized by the discharge of pure serum from the nose and by sneezing, without any organic disease of the nose. In most of the cases he had secured a practical cure by various measures. These measures were, cold frictions with a wet towel every morning; the application of a mild electrical current to the nape of the neck, and the administration of one one-hundred-and-twentieth of a grain of atropine on an empty stomach every morning, and of one drop of Fowler's solution after each meal. Under this treatment he had made these patients comparatively comfortable.

Dr. W. K. Simpson, of New York, said that, though there were undoubted conditions due to nasal reflex, he thought there was a tendency to carry the subject too far, and the longer he studied the cases of so-called reflex troubles he was more convinced that in these cases we should examine carefully for direct lesions of the organ chiefly disturbed. He cited two examples: One a marked case of asthma in a patient whose nose was filled with nasal polypi, the removal of which did not influence the asthma. Further examination revealed chronic Bright's disease, of which she died, retaining the asthma until her death. The second case was one of marked aphonia, with symptoms of intense throat and ear irritation of the left side. Examination of the ear revealed the canal to be filled with a foreign body (a June bug) which had lodged in the ear while the patient was asleep on the grass. Removal of the foreign body relieved the irritation of the throat and aphonia for a while, but the aphonia subsequently returned, when examination showed paresis of left vocal cord and aortic aneurysm, of which patient died. The foreign body in this instance, instead of being a reflex cause, was merely a coincidence, and in both cases the symptoms were far deeper than reflex.

Dr. H. L. Swain said that he had been greatly interested in these vaso-motor disturbances, owing to a study that he had made of cases occurring in his own practice. Dr. Bosworth, in his book, had tabulated the cases of asthma that he had been able to cure by intranasal treatment. This had led him to search through his own case books and determine the percentage of cures in his own practice. The result of this search had been that the percentage tallied very closely with Dr. Bosworth's second list. While he agreed with Dr. Simpson in much that he had said, there were certainly many cases where the patients were strikingly benefited by the removal of intranasal disease. We were, however, confronted with the fact that certain elements were always necessary to produce asthma in any individual—a diseased condition of the nose, an irritability of the bronchial tubes, an irritation which came to the nose, like pollen in hay fever, or the cold which produced swelling in the nose, and lastly, the neurotic habit producing vaso-motor irritability, which would connect the nose and bronchi.

We must always admit this last element, but there were other systemic causes which might act as excitants. He had had a case similar to the one reported by Dr. Simpson, in which Bright's disease had been the underlying condition; but in this case he had found that the better the condition of the nose, the less did the patient suffer from the asthma, irrespective of the condition of the kidneys. Three or four years ago he had reported a series of cures, and a recent examination had shown that only three or four of these cases had relapsed. While therefore admitting that there might be a revulsion of feeling regarding reflex disturbances, he still felt that many cases of asthma would be relieved by treatment of the nose. He had been interested in the report of Dr. Mulhall's case, for the treatment had been almost the same as he had independently employed in his own cases.

Dr. Shurly said that generalization on phenomena belonging only to a portion of the human body did not constitute good philosophy. If all cases of asthma, for example, were viewed from the standpoint of the general practitioner, one would be surprised to find how many of them did not exhibit any obvious structural changes in the nose. There were two kinds of vaso-motor phenomena, he thought—one which was transient, and one in which structural change followed from the frequency with which the vaso-motor perturbation occurred. The latter class of cases was certainly greatly benefited by operative procedures upon the part structurally affected. But the other class could not be improved by any such treatment. At one time he had made a series of experiments on dogs, and had found that irritation of the spheno-palatine ganglion produced all the phenomena of asthma in some dogs but not in all, and that irritation of the mucous membrane of the trachea always gave rise to a condition like spasmodic asthma. If this spasmodic asthma continued for a certain length of time, as every one knew, it would give rise to pulmonary emphysema, and again as a result of habit it would leave a tendency for paroxysms of asthma to recur. He thought we should all be grateful to Dr. Daly for bringing the practice of burning the nasal membrane to the notice of the profession, for it was certainly very useful in a minority of cases—*i. e.*, in those cases in which abnormities of the nasal chambers could be detected.

Dr. Lowman said that in all conditions of this kind the constitutional state of the individual, particularly of the nervous system, was an important factor. The pathological lesion would not always be found where one would expect to find it from the symptoms. Thus, in a case of neuritis with spasm of the hand, under Dr. Starr's care, the cause of the neuritis had been found to be a small knot of black silk which had been used in suturing a cut in the wrist. So he thought that in these diseases under discussion the pathological state might be quite insignificant and yet the symptoms be very marked. He recalled a case of polypi in a man suffering from asthma. The polypi were removed, but the asthma was not at all improved. The physical exami-

nation of the lungs showed some pulmonary emphysema, and the examination of the sputum revealed tubercle bacilli. In this case, therefore, the tuberculosis was the true cause, and the polypi acted as an additional exciting cause.

Dr. Daly said that in his article of thirteen years ago he believed he had raised the question as to "whether we were warranted in considering any case of asthma purely a neurosis without having first examined and rectified any disease found in the nose or pharynx." This predicate had been the foundation upon which all this broad therapeutic practice had been built. This practice had grown in the face of the utmost incredulity at first, but had now been accepted in all parts of the medical world. Many of his medical acquaintances who had been apparently incredulous at first of the opinions and teachings that he had promulgated had nevertheless put those teachings into practice and not met with disappointment. He had never maintained that all cases would be benefited by this line of treatment, but that he had had sixty-three per cent. of cures in hay asthma with nasal abnormities were statistics that were entitled to consideration, since no treatment which ignored his teachings could possibly accomplish such good results.

Paper.

COMPENSATORY ARYTÆNOID MOVEMENT.

By WILLIAM PORTER, M. D.

THE tendency in our physical organization to atone for a local or even general deficiency is an interesting study. Where one sense is lacking, other senses are often more acute. The blind man hears better than the average man, and the deaf see more exactly. Especially marked is the attempt at compensation where there is a fault in one of two similar organs. Cases in point will be recalled by every one. A young man who had always laid claim to more than an ordinary range of vision was recently told by an oculist that the vision of one eye had never been of any value. A patient from New Mexico was found to have almost entirely lost not only the use but the substance of one lung, owing to large abscesses, yet the other lung had so developed as to do the work of two, and the man is well and strong, with no trace of disease except the local deformity. An author tells us of a frontier camp where a one-eyed man was the best marksman and a one-armed man had the strongest grasp.

Two cases of imperfect movement of the laryngeal muscles have

interested me in the study of compensation in voice production. In each case the fault seemed to have been of long duration and, so far as could be determined after a lengthened period of observation, was entirely local. Instances of unilateral paralysis of an adductor from pressure upon the recurrent nerve, or from temporary one-sided inflammation, or where there is a mechanical obstruction, are known to us all. I believe the cases here presented, though possibly not unique, are comparatively rare, and are illustrations of partial one-sided ankylosis, with increased compensatory action of the opposite side.

The first case is that of a singer, a tenor of national reputation, well known for the accuracy and flexibility of his voice. I first saw him on account of a slight acute pharyngitis and noticed a marked abnormity of the laryngeal movement. The left arytænoid advanced, on phonation, a little more than one half the usual distance. There was both adductor and abductor action, but limited. The cords were normal in appearance and the whole larynx in rest was not suggestive of any impairment. When phonation was made, the right arytænoid advanced well beyond the median line, meeting the left and making the line of approximation of the cords incline very much to the left. I have examined him at intervals of a year and have noticed no change at any time in the movement, and I have never been able to discover that his voice was in any way affected by the condition. There was no history. He never had had laryngeal trouble to his knowledge, and said that his throat "was always ready for hard work." Physical examination of the chest and along the recurrent nerve gave no evidence of pressure from any source.

The second case is that of a young business man of this city who came to me almost aphonic. He had some slight laryngitis and almost the same phenomena in movement as described in the other case. The inflammation was surely not sufficient of itself to produce the aphonia. He had consulted several excellent laryngologists who, he said, were unwilling to encourage him as to the prognosis, and, I am afraid, he did not get much comfort from me. I believed, as I do now, that there was a permanent though not complete ankylosis of the left arytænoid, for there was no remote or peripheral paralysis of neurotic origin discernible. As soon as the local inflammation, which was not great, subsided, strychnine was given and the laryngeal electrode used daily. It is possible that a little movement was regained on the left side, but certainly there was increased movement of the corresponding side. Soon his voice was entirely restored and has continued strong for two years. There is still the impaired movement on the left side and the compensatory action on the right.

In the absence of any history, rheumatic or specific, it is possible that in each of these cases the fault may have been congenital, and in the last instance the aphonia may have resulted from the slight laryngitis, which

of itself might be unimportant but sufficient to hinder approximation in a larynx incapable of free normal movement.

Several authors speak of the difficulty of distinguishing between paralysis and ankylosis where there is diminished arytænoid movement. It is possible that paralysis exists in each of these cases, but we should expect that increased effort of phonation would result in some movement beyond a certain point always reached when phonation is attempted. In these cases no effort will bring the left arytænoid beyond a certain point. There is, as before stated, a little movement, but it will be remembered that the cricoid surface of the crico-arytænoid articulation is merely a facet. It is a reasonable explanation that there is an adhesion between the inner margin of the facet and the arytænoid, and that this adhesion permits of some adductor response, with slight rotation of the arytænoid inward. It is perhaps unimportant whether the limitation of movement is due to a partial paralysis of the adductor or such an adhesion between the cartilages as suggested. We may conclude, however, that permanent restriction of movement on one side of the larynx does not always prevent perfect phonation.

Paper.

THE CIGARETTE HABIT.

By J. C. MULHALL, M. D.

AS a member of this and the Climatological Association, and as one who has smoked cigarettes for twenty-five years, I feel that I may speak with a certain amount of authority on this subject. "You, a throat doctor, and smoke cigarettes!" is a phrase that has finally wearied my ears; and, bubbling with mild wrath, "I rise to explain."

The pleasure and the penalty of this vice have never been rationally described, to my knowledge, other than by myself. This I did in a paper published in the *St. Louis Courier of Medicine* some eight years ago, and so little notice was given it that what I now say will be practically new.

A word as to the tobacco habit in general. Mankind pursues various methods in using it: by chewing it, by dipping, by cigar or pipe, by snuffing, and by cigarettes. There is a reason why each one pursues a particular plan. Early associations have much to do with the selection of the plan; but, apart from this, each method has its own particular pleasure. The man who both chews and smokes derives a different kind of satisfaction from each method, and he would derive a still different kind did he take snuff. Ciga

rette smokers may be divided into those who inhale the smoke and those who do not. The latter class is a very small one and the pleasure is the same, in a milder degree, as that of the cigar and pipe smoker, wherein the smoke chamber is the mouth. But all real devotees of the cigarette inhale. That is, with a quick inspiratory act, the smoke is drawn through the larynx into the trachea and, so far as I have been able by different experiments to learn, into the first division of the bronchial tubes; not, as the public believes, into the lungs proper. These inspirations are nearly always superficial, and the fact alone that there is a tidal and residual air would teach that the smoke does not reach beyond the bronchial tubes. Inhalation explains the pleasure of cigarette smoking. If the cigarette smoker did not *feel* the smoke in his larynx and windpipe, his pleasure would be gone. Every old cigarette inhaler will tell you this fact: that if he perchance smokes a brand of cigarette very much milder than that to which he has been accustomed, he will at once reject it, simply for the reason that larynx and trachea have been accustomed to a certain degree of irritation. The larynx and trachea have, so to speak, acquired a habit which rejects any unusual departure. For the same reason the inhaler rejects a brand of cigarettes much stronger than that to which he is accustomed, nor will he inhale the smoke of a cigar—vastly more irritating than that of any cigarette. The inhaler may change his cigarette for one more pleasing to his sense of flavor, provided always, however, that it satisfies his accustomed degree of laryngeal and tracheal irritation.

The pleasure in cigarette smoking, therefore, as compared with other tobacco habits, may be said to be a pleasurable irritation of the laryngeal and tracheal sensory branches of the pneumogastric nerve.

Another question frequently hurled at me in all these years has been, "What satisfaction can you get out of those weak little things?" The question means nicotine satisfaction. I once more rise to explain.

One absorbs nicotine in accordance with the amount of absorbent surface in contact with the column of smoke. In ordinary smoking the mouth alone is the smoke chamber; but when one inhales, one must add to the mouth the mucous membrane of the larynx, windpipe, and larger bronchi. There is, hence, roughly speaking, three times as much surface for the absorption of nicotine; and consequently, though a cigar contains vastly more nicotine, three fourths of it is wasted, so far as the question of nicotine intoxication is concerned, as compared with the cigarette. Moreover, the cigarette

smoker consumes two or three while the cigar smoker consumes one. The puny cigarette is, therefore, not so weak as it appears, and with this explanation begins to appear worthy of the newspaper term "deadly." Again, the cigar smoker, as compared with the cigarette smoker, is an infrequent consumer. We know that, with most drugs, if we divide an ordinary dose into ten equal parts and give one part every ten minutes until the ten parts are taken, we get a more powerful effect than if the whole were given at one dose. So it is with cigarettes. The dose of nicotine is smaller, but the doses are much more frequently repeated. I can smoke one large, strong cigar in the ordinary manner without evidence of nicotine intoxication, but I can not smoke three cigarettes inhaled, in succession, without nausea or vertigo or a rapid pulse.

The evil effects of cigarette smoking may be divided into the local and constitutional. As compared with other tobacco habits, if the cigarette were composed of other ingredients than tobacco and paper, we should, as clinicians, be prepared to look for different signs and symptoms. So far as the constitutional effects are concerned, I wish to state, as one who has carefully watched this question for fifteen years, that they are absolutely the same as those of tobacco used in any other form. The evil symptoms are always those of nicotine poisoning—not those of any other drug. The only chemist of high standing who, to my knowledge, has analyzed cigarettes is Dr. Ledaux, who last winter presented to the Section in Jurisprudence of the New York Academy of Medicine a report of the analysis of several popular brands of cigarettes. The dealers from whom he obtained the samples expressed their hope to him that he might find all kinds of narcotics in them. They explained that handling them was a nuisance to them; that all the profit accrued to the cigarette trust. He found absolutely no evidence of any other drug but nicotine in the tobacco, and in the paper a harmless quantity of cellulose.

The W. C. T. U. has endeavored to crush the cigarette evil by asserting that opium, *cannabis indica*, and other narcotics were present in cigarettes. Vice can not be cured by misrepresentation. The only narcotic present is nicotine, and this is an evil or not according to a great many different circumstances. That chief circumstance when, without exception, it is always productive of great harm, is youth. Every medical man will admit, theoretically, that this should be a fact, and the few who, like myself, have made practical observations will tell you that they never saw a child (I mean by this term those who have not reached puberty) who used tobacco

habitually whose health was not in some manner badly impaired. What else would one expect the tender, growing nervous organism to do but wilt under the steady daily influence of a drug like nicotine? In adolescence—and practically this may be said to be from puberty until eighteen in females and twenty-one in males—the evil is not so great, but is still a great one; for, though the nervous crisis of puberty has been passed, the nervous system is still rapidly developing. The nerves are more resistant than in childhood, but, on the other hand, greater demands are correspondingly made upon them, either by the higher phases of education in one class or by the actual daily struggle for existence in the other. That the use of tobacco is a serious handicap in adolescence is proved by the investigations of others than myself. At several of our great universities it has been found by exact and scientific investigation that the percentage of winners in intellectual and athletic contests is considerably higher in the total abstainers from tobacco. Sammy, the best known newsboy of St. Louis, who by his wit and energy at the age of fourteen has accumulated quite a bank account, at my instigation made a series of unbiased observations concerning the newsboys of St. Louis. He found, other things being equal, that the selling capacity of the boy who used no tobacco was much greater than that of the boy who used tobacco either by chewing or by smoking.

It being admitted that the use of tobacco is a great evil in the young, it follows as a self-evident proposition that any method which encourages its use must be more reprehensible than a method which discourages its use, and the cigarette above all other methods presents this encouragement to the use of tobacco. In its mildness is concealed its very capacity for doing harm, for the reason that it teaches the use of tobacco. Every one knows the picture by Brown of a newsboy clinging to a lamp-post, limp, pallid, and vomiting, entitled "His First Cigar." Had it been his first cigarette the picture would not have been true to Nature, for, unfortunately for our growing youth, the first cigarette does not induce this deathly nausea. Were this only the case there would be but one cigarette smoker in youth where there are now a hundred. The boy at first uses only the mouth as a smoke chamber, and as a cigarette is so mild he absorbs but a minute quantity of nicotine, insufficient for nausea. He gradually becomes able to consume more cigarettes, and quickly acquires nicotine tolerance. He is not allowed to pursue this method long. Invariably some other boy teaches him to inhale. At first it causes violent cough and many would never repeat the attempt, but

the taunts of the other boy are heard, and with the bravado of boyhood he perseveres. The larynx and windpipe soon tolerate the smoke, then demand it, and the boy is a full-fledged cigarette fiend.

The mildness of the cigarette explains also its fast-spreading use among young women, especially the leisure-class young ladies. As a rule they do not inhale, for at the first attempt the violent cough ensuing quenches ambition in this direction, and, unlike the youth or the boy, she is seldom encouraged to persevere. The fear of a tobacco-tainted breath also curbs her habit. In young ladies who smoke cigarettes very moderately and who do not inhale I have never seen evidences of nicotine poisoning. Their immoderate use, even without inhalation, may, of course, afford sufficient nicotine to disturb the health. Apart from this, however, I join hands with the ladies of the W. C. T. U., who in New England have established anti-cigarette leagues among young ladies reformed of the habit, because of the pernicious example these young ladies may set to the youth and childhood which surround them.

Personally I may add that when I am appealed to on the same ground I freely admit the force of the argument. I, however, do not pose as a reformer or advocate, only as an expert.

The great evil of tobacco is its constitutional effect on the nervous system. The much lesser evil is local—namely, on the upper respiratory organs. My experience, like that of Morell Mackenzie, is that, provided there is no other factor, the use of tobacco provokes little or no disturbance to these organs. That it may aggravate a throat or nose trouble occasioned by other causes I will admit, or that by its constitutional depressing effect it may aggravate such trouble I will also admit; but, excluding all other causes and looking at tobacco purely in respect of its local effect, I must deny that it ever causes, as ordinarily used, throat disease worthy of the name. There are a few exceptions as there are to all laws in medicine. There are idiosyncrasies in regard to the use of tobacco, both with reference to the throat and the nervous system. They are rare. Tobacco, in its ordinary use, at most produces a slight hyperæmia or insignificant catarrh in the healthy throat. As used in cigarettes—that is, by inhalation—the smoke comes in contact with the laryngeal, tracheal, and bronchial mucous membrane, and here produces in many the same trivial hyperæmia and secretion. This latter is pearly and is ejected with a single gentle cough. I am unaware that I have this slight cough unless reminded by others. I have occasionally heard whistling râles in the bronchi of those who inhale very deeply

and are immoderate smokers. Hyperæmia, not inflammation acute or chronic, is the sole disturbance. The effects in the larynx of the ordinary healthy man seem almost nil. Mario, the great tenor, inhaled cigarette smoke between the acts. I experience no vocal difficulty in delivering lectures. Maxwell, the murderer of Preller, was confined in the St. Louis jail for two years, during which time he inhaled an average of forty cigarettes a day. I secured the larynx and trachea of Maxwell, but could discover no evidence of morbid change other than a fracture of the hyoid bone caused by the hangman's rope.

Twenty years ago in this country this habit existed, but was unusual, probably because each consumer was compelled to make his own cigarettes. But since the American manufacturer with his advertising genius has scattered them over this country, ready made and very cheap, the habit has grown enormously. Nervous diseases and insanity are rapidly increasing in the American people we are assured by our own neurologists. Our nation was already noted as furnishing proportionately more neurasthenics than any other. If to such an inheritance American youth then adds the nerve-destroying nicotine habit which the cigarette so materially assists in spreading, there is grave reason to hope that the cry of reform may be echoed and re-echoed throughout our glorious country. There is no such instructor of the public as the press, and I trust that our newspapers will publish broadcast such information as this and kindred essays may give them on what is fast becoming a national vice in American youth—the cigarette habit.

Discussion.

Dr. Ingals said it was most fortunate that such an old cigarette smoker was alive to tell this tale, and was willing to tell us in just what respect cigarette smoking was objectionable. It was well that people should understand the difference in the effect produced by smoking cigars and by smoking cigarettes. He was sorry that the author of this admirable paper should have made the grave mistake in the latter part of his paper of intimating that tobacco smoking did no harm. He thought that all the members had seen chronic pharyngitis and irritable conditions of the fauces which were apparently due to smoking. Personally, he had seen many persons whose nervous systems had been seriously affected by indulgence in tobacco. The author had stated that the local effect was slight, and this was probably true in the majority of cases but not in the large minority.

Dr. Carl Seiler said that Dr. Ingals spoke without experience as a smoker, and hence he could hardly enlighten us much on this sub-

ject. The speaker said he was himself a smoker, and he had never seen a case in which any local effect had been produced by smoking, except in those American smokers who did not know how to smoke, and who were continually expectorating, thus producing an abnormal dryness of the pharyngeal mucous membrane. The smoke of a cigar or pipe, if not inhaled, remained in the mouth, a part which was covered with tessellated epithelium, and not with columnar epithelium.

Dr. Daly said that he had begun smoking when he was about seven or eight years of age, and had smoked ever since then, for the most part, temperately. He had always experienced a sense of great depression, except when he had smoked after taking some stimulant or a hearty meal.

Dr. Langmaid said that he had understood the reader of the paper to say that there was but little irritation of the pharynx and larynx as a result of cigarette smoking. He recalled a stalwart Irishman whom he had seen in his office. An examination of the throat had led him, in spite of the man's nationality, to express the opinion that the patient was not a smoker, and the man had admitted that such was the case. He had known this by the coloring of the mucous membrane of the pharynx and larynx. If this observation had been correct, and not simply a shrewd guess, it was evident that there was a decided local effect upon the mucous membrane. He thought that all would admit that the female throat was ordinarily less hyperæmic than the male throat—at any rate, this was particularly noticeable in singers. During the past winter he had had occasion to treat a physician with a very irritable throat. While the associated mental disturbance and other symptoms were not to be attributed to the use of tobacco, he had been forced to the conclusion, as the patient also had been, that the smoking was responsible for most of the trouble. He could invariably tell from an examination of that man's throat when he had refrained from smoking for a few days.

From a large personal experience in the treatment of prominent singers, he had found that smoking exercised a potent influence on the voice. In his own case, he had learned that, in order to be in good voice, he must not smoke during the day if he was to sing that evening. Because one prominent singer could smoke and sing, this was no argument that others could do so. The best singers of to-day underwent a great deal of fatigue. He had in mind one singer with a magnificent voice, in whom he felt sure he could detect the effect of cigarette smoking. He had known another singer, an inveterate smoker, who had found it necessary to abstain as long as three weeks at a time from smoking, in order that he might be at his best for some great effort in singing. He would say that the bad effect on the pharyngeal mucous membrane was much less from cigarette smoking than from pipe smoking, for the reason that the smoke was not so hot. What he objected to in cigarette smoking was its destructive effect upon consecu-

tive thought. The cigar smoker did not want to be narcotized; the cigarette smoker did want this.

Dr. Simpson related his personal experience with regard to smoking and its local effect upon the singing voice. The reader of the paper had spoken very pertinently when he had said that it was in the allied conditions that the local effect of smoking was increased. At one time he had given up smoking absolutely for eight years, and passed through what seemed to be similar to the experience of the opium smoker in his attempt to give up his habit. During this period when he was not smoking, his throat had been free from any discharge or uncomfortable sensation, and he had been able to use his voice with remarkable ease. After he had resumed smoking he had found it much more difficult to keep the singing voice in good order. The barytone did not suffer so much as the tenor voice did from smoking. He also felt that he could detect a smoker's throat by its appearance.

Dr. Newcomb thought there was a certain amount of habit about smoking, independently of the effect of the tobacco itself. Those who had looked into the literature of pharyngeal mycosis know that all writers alluded to the possible good effect of tobacco in that condition. He now had under his care a young Swedish woman of splendid physique, and without any bodily disturbance except a pharyngeal mycosis. She had been treated with the cautery, but without much benefit. She had then been lost sight of for a time, and on her return had been decidedly improved. She had finally admitted that during this time, on her own responsibility, she had been smoking Monopole cigarettes without inhaling the smoke. It seemed that in this case, at least, the smoking should be given a large share of the credit for her improvement.

Dr. Langmaid said that he had once tried the use of a solution of nicotine in a case of this kind, and with a most disastrous result. The application had been followed by immediate and severe syncope. He wished to warn against this, although it had been recommended.

Dr. Swain said that an interesting fact brought out by certain measurements taken in the colleges relative to the physical development of the students, had been that among tobacco smokers, as a class, there was a smaller chest expansion than among other students.

Dr. Longman remarked that this paper filled a hiatus in medical literature—*i. e.*, the description of diseases by physicians affected with them. There was altogether too little of this in our medical books. It had occurred to him during the discussion that possibly the irritation observed by Dr. Langmaid in singers might have been due to many of the slight causes well known to affect the throats of singers. Some well-known singers could not expose themselves to the air while riding —was this an argument, therefore, in favor of giving up open-air exercise?

Dr. Murray said that one of the most important features of the

paper had been the serious yet truthful charge made against the cigarette that it enabled young people to acquire the tobacco habit.

Dr. Mulhall said that he admitted the truth of the observation made by Dr. Langmaid on the local effect of tobacco on the singer's throat. The tenors and sopranos, as compared with other singers, must have very perfect throats and command perfect laryngeal muscular control, and hence not only the local effect but the indirect effect on the nervous system was of importance in such individuals. Ordinarily, smoking produced only a very transient hyperæmia. He had not been so successful as Dr. Langmaid in detecting a smoker by the appearance of the throat. He had never seen pharyngeal mycosis in smokers' throats, and to this extent could confirm the statements generally made on this subject by writers. A medical friend of his, however, had told him that he had a smoker for a patient who was affected with this disease. He could not understand how tobacco smoke could reach sufficiently deep to affect the seat of this affection. He believed he had been the first to call attention to the fact that pharyngeal mycosis was a disease which would sometimes disappear spontaneously and reappear. That tobacco smoking led in a certain degree to the use of stimulants could not be denied, owing to the temporary depression produced by smoking which could be removed by alcohol; but the combined effect of alcohol and tobacco was very bad in the end.

Paper.

NASAL CHARACTERISTICS, HUMAN AND COMPARATIVE.*

By Mr. CHARLES H. WARD.

MR. CHAIRMAN AND GENTLEMEN: When your president called on us last Thursday to arrange for a visit from the members of the American Laryngological Association, I regretted that fate had not set the date of your meeting some months hence.

Not that you are any the less welcome to-day, but that we are unprepared to entertain you in your chosen line of investigation.

As an establishment we devote our energies to the making of scientific collections—collections of rocks, of fossils, of meteorites, of shells, of corals, of skins, and skeletons—in fact, of almost everything within the broad domains of *natural history.*

* Read before the American Laryngological Association at its seventeenth annual congress on the occasion of their visit to Ward's Natural Science Establishment. Meeting held in the Hall of Invertebrates.

Many are the *special collections* which have been gradually built up within these walls. That of comparative odontology, purchased by the New York Odontological Society, and of *sponges*, which pretty nearly fills the next hall, are examples.

The *making* of a collection which shall illustrate exhaustively and well a given subject is a great educator. Probably no single person is so much benefited by a collection as the maker.

Starting with but a rudimentary or even superficial knowledge of the subject treated, the museum-builder works up from the simple to the complex, from generalities to specialization.

He becomes an enthusiast, a monomaniac, a devourer of monographs and costly subscription books—in fact, to an unappreciative public, a crank.

But at about the stage when the embryo odontologist begins to speak of this skull as exhibiting a monophyodont homodont dentition, or of that as "a splendid case of *pyorrhœa alveolaris*," the collection is completed, perhaps sold, and our enthusiast returns to earth again, to become absorbed in turn by other and possibly remote subjects. *Superficial* in a sense he must perhaps ever remain, but far from ignorant. Those weeks or months of rapt study, amid a profusion of material, a library of authorities, and frequently with occasional advice and assistance from the purchaser—always an enthusiast and a master (for, gentlemen, it is the rule that those require most illustrations who best understand their subjects)—this short, high-pressure, practical course has etched certain truths deep into his cortex, never to be entirely effaced.

It has been my good fortune as a member of the working force of this institution to contribute to the series of special collections, particularly in the department of human anatomy.

Later, after Professor Ward has shown you his sponge collection, which competent authorities have adjudged the finest in any museum, American or foreign, I shall be pleased to exhibit a series illustrating human odontology.

Some time last fall the speaker made a little suite of sectioned skulls, showing the auxiliary fossæ of the nose, for Dr. George M. Lefferts, of New York, a duplicate of these here exhibited, the idea being to limit the attention of the student to one point on each specimen. The maxillary, frontal, ethmoidal, and sphenoidal sinuses are in turn revealed in four of these preparations, the fifth being an antero-posterior section of the entire skull a little to one side of the median line. (See Fig. 1.)

Quite recently we agreed to make for the same gentleman a series of *fifty skulls* to illustrate variations of nasal septum, spurs, angles, dislocations and fractures of vomer, etc. We expect also to

Fig. 1.—Sectioned skulls.

include a limited number of ethnological peculiarities of the anterior nares, examples of diseased turbinals, etc. As this order was received but a fortnight ago the collection is as yet hardly commenced. Hence my expressed wish that your meeting had chanced a little later. At present, we will call it the nucleus of a collection, and the labeling merely provisional. As appears from the titles of papers in your programme, not alone the larynx, but the nares, the sinuses, and adjacent territory, are embraced in your repertoire. A few remarks on this region, from both an anthropological and a comparative standpoint, may not, therefore, prove amiss.

We love to reread even a well-known tale in an illustrated edition. Permit me, then, to review a few anatomical facts for the sake of the illustrations.

We distinguish as the nose the partially bony, partially fleshy

and cartilaginous anterior prolongation of the nasal chamber. It has, in the human species, a twofold function:

(1) The lodging of the first paired organs of special sense, the olfactory apparatus; and (2) as the external orifices (also paired) of the respiratory system.

It also subserves, as shown by Charles Bell, by Darwin, and in detail by Dr. Harrison Allen, as a means of expression, certain flexures of its muscles following certain emotions of the mind.

To Lavater it stood for much more: it was the outward and visible sign of a temperament, a character. We instinctively associate the Roman nose with command; the Grecian with a fine æsthetic sense; the extremely thin and sharp nose with penetration, and the like. Besides all this it is a most marked hereditary feature. Cowper's humble hero, who

> "Would not, with a peremptory tone,
> Assert the nose upon his face his own,"

was perhaps wise. It might have been his grandmother's.

Developed, doubtless, originally as a primitive food inspector, a toxicological expert ever on the alert, the position of the nose above and in advance of the mouth is well considered.

As we glance through the zoölogical series, the nose or its homologue assumes strange and bizarre forms and functions.

Absent altogether in many lowly forms, to all of whom respiration is a necessity, the presence of an olfactory organ is either extremely problematic, or suspected but unproved, in numerous cases, as, for example, the jellyfish.

That this sense is one of the earliest to appear, however, can not be doubted. The olfactory sense in insects and molluscs is, when demonstrably present, frequently far removed from the respiratory system, the former breathing through a system of pulmonary tracheæ that opens on the exterior by numerous spiracles, the latter, either by gills, as in the oyster, or by a single contractile spiracle, as in the shell-less land snail.

Passing to the vertebrates, in the skull-less amphioxus or lancelet, specimens of which we have here, we find the respiration still carried on by means of gills, while on the left side of the anterior end of the body—the head end—an involution of the integument, a little ciliated pit, reaches inward toward a slight prominence on the spinal cord.

Like the ear or the mouth, an involution of the skin marks the first appearance in vertebrates of the olfactory apparatus.

Unlike the ears, however, it begins as a *single* organ, as in the lancelet, the hagfish and the lamprey, in which latter the olfactory lobes *exceed in size the cerebral hemispheres.*

Classifically, these single-nostril forms are differentiated as *Monorrhina* from all higher vertebrates, which, having *paired* nostrils, are termed *Amphirrhina.*

In the *Teleostei*, or bony fishes (this perch, for example), respiration is still by means of gills, while the nostrils or olfactory orifices, now paired, appear just in front of either eye. The nasal sacs, however, do not communicate with the mouth.

In the *Dipnoi* or *lung-fish* a curious modification occurs. Living in shallow streams which dry up during the hot season, it has developed accessory lungs, which enable it to breathe air during its annual imprisonment in the dried mud of the river bed—a truly amphibian life.

Its nasal sacs, as in the higher vertebrates, communicate with the mouth cavity.

The frog, beginning life with gills, exchanges them later for lungs. Its nares, originally used as strictly olfactory orifices, now take part in respiration, while, owing to absence of both ribs and diaphragm, the frog can inhale only by a bellows-like action of the mouth cavity, gulping his air as required. He can not breathe with his mouth open.

We note, *en passant*, that *voice* here appears; the musical notes that pulsate so persistently through these long spring evenings is a *batrachian* serenade—a love song—and strictly *masculine.*

Voice, then, is primarily a sexual allurement. The vague emotional disturbances produced in the most prosaic mind by the wailing notes of the violin or the rhythmic drum-beat seem beyond reason in their intensity, stimulating as they do brain centres that were *before reason* in development.

It is among reptiles that we first find true nostrils—combined respiratory and olfactory orifices.

These are always paired, although in the ophidians associated with but *one functional lung.* The nasal bones, constant in other vertebrates, are absent in most chelonians.

The larynx, while more perfect than in batrachians, is still far simpler than in birds. A certain historical serpent excepted, the class of reptiles may be described as voiceless. The crocodiles, highest of reptiles, have valves with which to close their nostrils when wrestling with their prey in deep water. Old males among

the gavials, or Gangetic crocodiles (see cut *e*, Fig. 3), have also a considerable enlargement of the nasal sacs at the tip of the snout, which enables them to remain below the surface much longer than can the females. Furthermore, the crocodile can hold a victim steadily under the surface in his open mouth, breathing betimes through the nostrils which crown the tip of his extraordinarily elongated snout —another valvular arrangement cutting off all communication, for the time being, between mouth and respiratory passages; while still other valves, or cutaneous lids, seal his ears at will.

Respiration reaches its highest degree of perfection among birds: in them the blood is more rapidly and perfectly oxygenated than in any other form of animal. The bodily temperature is consequently higher. Not only are the lungs capacious, but a system of subsidiary air-sacs, nine in number, traverse the body-cavity, encroaching on the abdominal viscera; while, connecting also with the lungs, the hollow bones are stored with heated air, in some instances even as far as the phalanges, making a sort of living balloon. Nor is this arrangement confined to the birds of flight: this femur of the African ostrich, which gives attachment to muscles formidable in their strength, is but a shell; how different, for example, this smaller bone—a humerus—from an animal which lives on the sea bottom, and whose specific gravity must therefore be great. (I refer to the manatee).

John Hunter ligated the trachea of a bird, which continued to breathe through an artificial opening in the humerus.

What possibilities of operative procedure does not this suggest, were only human subjects able to breathe in the same way!

The true larynx in birds, although present, is not the organ of voice. It is in the syrinx, or so-called false larynx, a flexible enlargement of the *lower end* of the trachea, just above the branching bronchi, that the musical notes are made. The stork, the eagle, the ostrich, lacking the syrinx, are mute, or utter only discordant cries. In the crane and swan a most unusual modification appears. We have here the body of a swan in which you will observe that the trachea, instead of entering the thorax directly, descends to the sternum, which it enters, and, describing a long horizontal loop in the body of this bone, re emerges and, rising, enters the lungs. Hence the booming trombone note so distinctive of these birds. As foreshadowed in the frog, the songs of birds are in part sexual cries, the male almost invariably excelling the female as a vocalist.

The nares, invariably two, may present as mere slits, as in the

pigeon, or be produced as horny tubes, such as characterize the albatross. They may open close to the head on a very long-billed bird, as this pelican, or appear at the tip of the bill, as in that rare form, the wingless apteryx of New Zealand—degenerate scion of those gigantic forms, the *Dinornis* and *Æpyornis*. Note that, like the crocodile, the pelican can breathe with its mouth (bill) submerged, but, living *above* the water, its nostrils are brought *close to the head*, instead of at the tip of the elongated snout, as in the former. The relative position of the submerged prey to the animal's air supply remains the same, while the animals themselves are reversed.

The scent of birds is undoubtedly keen; how far this is supplemented or supplanted in birds of prey by their extraordinary powers of vision is mainly conjectural, yet the frightful rapidity with which buzzards congregate from all quarters at the death of an animal suggests some signal system of videttes as perfect as unknown.

b *a* *c*

FIG. 2.

Among mammals, the development of the cerebral hemispheres is usually accompanied by a corresponding diminution in size of the olfactory lobes. The monotremes, the lowest of mammalia, comprise two genera—the *Echidna*, or spiny *ant-eater*, a land animal, and the *duck-billed platypus*, or *Ornithorhynchus*, an aquatic form. So closely allied yet so dissimilar in appearance, the first is distinguished by a very *large*, the latter by a very *small*, cribriform plate. In ornithorhynchus but one olfactory nerve on either side pierces the cribriform plate; in echidna the olfactory nerves are very numerous, and are accommodated on broad ethmo-turbinals.

That the degenerate olfactory apparatus of the *platypus* is the result of his aquatic habits appears probable on a survey of the more strictly aquatic cetacea.

Among *marsupials* the olfactory lobes remain prominent, the nasal chambers in some kangaroos, remarkable for acuteness of smell, being much wider than the anterior portion of the mouth. (See

Fig. 2, *a*.) This development of nares reaches its extreme limit in the wombat (Fig. 2, *b*), in which the nares are absolutely wider than the brain cavity. Another peculiarity of the kangaroo deserves notice.

d *f* *g*

Fig. 3.

Born in an immature state, the young kangaroo is transferred to the marsupium of the female, there to be nourished by milk *ejected* from the teat of the mother, the young one being as yet too helpless to suckle. Nature prevents the strangling of the baby kangaroo by building upward a prolongation of the larynx, which is embraced by

k *i* *m* *h* *n*

Fig. 4.

the soft palate, respiration continuing unimpeded the while the lacteal fluid trickles in an unbroken stream *around* the craterlike larynx into the œsophagus.

Of *edentates*, most of which have highly developed olfactory organs, we will glance at the great ant eater (*Myrmecophaga jubata*), whose skull (Fig. 3, *d*) is interesting from its enormous nasal bones, measuring in this specimen 17·2 centimetres in length, and forming nearly one thirty-ninth by weight of the entire skull.

Among *rodents*, rabbits and hares are proverbially keen of scent, here obviously specialized as a *protective* measure. In the porcupine the nasals are the *largest bones of the skull* (Fig. 4, *h*).

Most rodents have the entire nose, save at the middle of the septum, covered with hair.

In *moles*, the external nose, produced into a sort of proboscis and worked by powerful muscles, is a most efficient excavator. The star-nosed mole (*Condylura cristata*) develops a curious, many-rayed, double star at the extremity of his snout, a sort of third hand, whose tactile impressions guide him in his subterranean rambles. Certain of the bats have leaf-like prolongations of the integument rising from the nose.

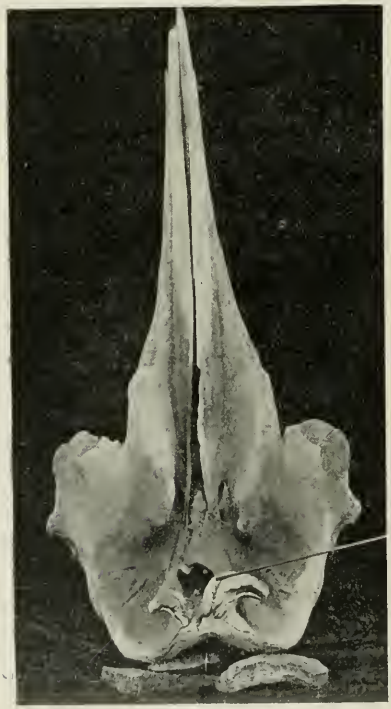


Fig. 5.

Singular conditions are observed among the *cetacea*. In all, the vocal cords are undeveloped, while, as in the baby kangaroo, the elongated larynx meets and is embraced by the soft palate, not here, however, as a temporary arrangement, to disappear with weaning, but a permanent provision against the encroachment of water into the trachea while feeding. The mysticeti alone of cetaceans possess olfactory nerves; we can state positively that the sperm whale knows not the odor of the ambergris which he produces —a perfume, by the way, elaborated as fæcal excreta.

In the sperm whale also, in common with others of the odontocti—as the *epiodon*, *hyperoödon*, etc.—the skull is remarkable for a

lack of bilateral symmetry, particularly in the region of the anterior nares, where the *right* aperture becomes very much the larger, the nostril continuing through the intervening soft parts to the exterior as a *single* tube, with but a single sigmoid vent. To the lookout in the crow's-nest of a whaler the spouting whale is thus instantly classified by the *single* or *double spout* long ere the animal's outlines permit of recognition.

Fig. 5 is a reproduction of a photograph of the dorsal surface of the skull of hyperoödon, the tip of the pointer resting on the anterior nares. A fine example of Nature's wondrous adaptitude is shown in these skulls—one (Fig. 11, *o*) that of the Greenland seal (*Phoca grœnlandica*), the other (Fig. 11, *p*) the tropical seal (*Monachus tropicalis*). In the former the inferior turbinals are expanded so as to present an immense extent of radiating surface, by which the icy

Fig. 6.

northern air is heated before reaching the lungs. But the tropic seal, breathing warm air, needs no such provision. Perhaps the most specialized nose among mammals is that of the elephant, in which the greatly elongated trunk serves not only for breathing and smell, but for prehension, for drinking—by drawing up water which is discharged into the mouth—as a trumpet, and as a club. Here

also the inferior turbinals are rudimentary alike in existing tropic and in extinct northern species, the respired air being sufficiently heated in its passage through the long trunk. Crowned by a horn, or even two, in the rhinoceros, it becomes a weapon of defense, while in the sensitive nostrils of the horse are volumes of expression denied to his artiodactyl neighbor, the ox.

Keen in the hunted ungulate, through the gradual extermination of the less gifted in this respect, the olfactory sense subserves an *offensive* design in the carnivora.

Like the nose itself, the *memory* of certain scents is hereditary; newborn kittens show unmistakable aversion to the odor of a puppy as conveyed by the naked hand.

The odors of animals appear to be mainly of either a sexual, an individual, or a protective character; the former, usually more marked in the male, may be permanent, as in the dog, or confined to the rutting season, as with goats. So implicitly do dogs depend on this sense that excision of the olfactories in young puppies has resulted in a *total inability* to *distinguish sex* in after years.

Individual odors are so minutely analyzed that a hound discriminates not only between species, kindred, sex, harmless and harmful invaders, but distinguishes the hereditary enemy, and, in trailing his leather-shod master across a populous city, must encounter myriads of tracks so similar that the mind pauses in wonder at the delicacy of this sense, beside which our boasted instruments of precision are rude indeed.

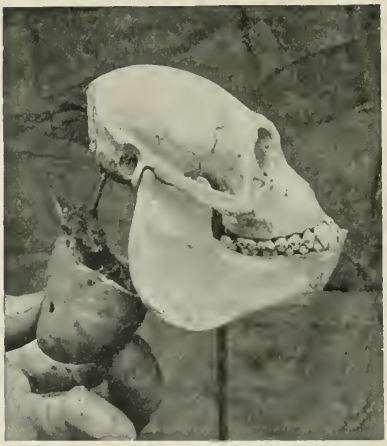


Fig. 7.

Protective odors may be emitted only at the moment of provocation, as in *Mephitis*, or may confer a permanent immunity from attack, as in certain insects.

As with voice, we find that scent also stimulates the reproductive functions. With the male as the active agent in emitting both sound and characteristic odor, the rôle of the female is confined to *receiving* the ensuing auditory and olfactory impressions. She there-

fore should be found more receptive, more sensitive, more *impressionable* to sounds and odors in general. Does not this hold true even of our own species? Is not the use of perfumes a *womanly* habit? A significant fact in this connection is the use of musk. A constituent of practically every perfume manufactured, it adds a peculiar zest to what were otherwise mere cloying sweetness. The *demi-monde* alone, however, as a class, are habitually redolent of its *unadulterated* emanations. Now, this odor, the base of every artificial olfactory delight, the chosen incense of the votaries of Venus, is a *typical sexual stimulant*, an emanation elaborated primarily as a *love charm* by certain specialized glands of the musk-deer.

Among *primates*—man's own class—no such radical variations of the respiratory apparatus would seem warranted as have been noted among the lower mammals. Let us examine. Geoffroy Saint-Hilaire long ago separated the monkeys of the Old World from those of the New by *nasal* peculiarities—the former as *catarrhine*, the latter as *platyrrhine*. In our illustration (Fig. 6) the golden howler of Brazil is contrasted with the rhesius of India.

Fig. 8.

Extreme variations of the vocal apparatus are found here close to man, of which the great hyoidean drum of the howler (Fig. 7), and the immense laryngeal pouches of the male gorilla, reaching down to and under the armpits, are examples. The nose itself is wide in South American monkeys, thinner in Asiatic ones, flat in the anthropoid apes, proboscislike in *Nasalis*, and widely varied in man.

Projecting far beyond the face in most Caucasians, it may be so sunken between prominent cheek bones, as in certain Eskimos described by King, that a ruler will bridge from one cheek to the other without touching the nose. Savages and barbarians seem

superior to the civilized races in keenness of scent. Humboldt's assertion that the Peruvians have three distinct words by which to designate the odor of the European, the Indian, and the negro respectively, reveals a delicacy of discrimination (or a pungency of odor) beyond our powers. Krafft-Ebing's account of the Swiss libertine who confessed to rousing the passions of his victims by the *odor of his perspiration* proves that even man has traces of a sexual odor.

Fig. 9.

Compared with vertebrates generally, however, the sense of smell in man is poor, even vestigial, and is accompanied by a corresponding atrophy of the olfactory lobes. Here is a series of models—casts of the brain cavities of various vertebrates—in which the proportion between olfactory lobes and cerebral hemispheres is well shown.

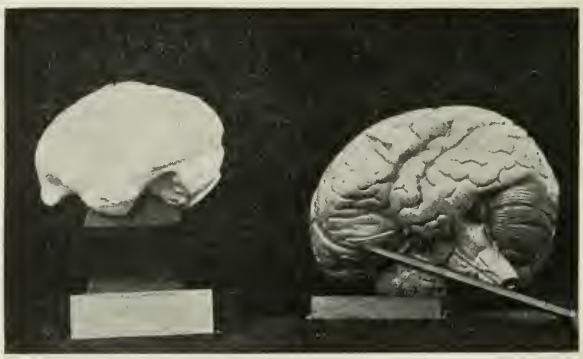


Fig. 10.

Beginning with the ornithorhynchus, we note the sudden enlargement of the olfactory region in the echidna, its absence in the porpoise, its marked prominence in the pig.

Compare the immense extent of this region in the extinct *Dinoce-*

ras—that primitive ungulate whose spinal cord *exceeded its brain in size*—with the same area in our modern horse. Note its great development in the tiger, the expanse of the cerebral hemispheres with corresponding diminution of these lobes in the gorilla, and, lastly, their vestigial character in man.

A certain relation between the nasal chamber and the nasal bones is found, the latter forming its roof. As has been pointed out by an honored member of your society, Dr. Harrison Allen, a very long proboscis may, nevertheless, be associated with very short nasals, as in the elephant (Fig. 3, *g*), and very long nasals with a short proboscis, as in the pig (Fig. 3, *f*). Familiar to students of

o *p*

Fig. 11.

human anatomy as *paired bones* forming a portion of the border of the anterior nares, they may develop as a single bone, as in varanian lizards, or become a single bone by early ankylosis, as in the orang (Fig. 4, *i*), and frequently in adult life in negroes and other aborigines. Present in all vertebrates (with the exception of chelonia, already noted), yet few of the facial bones offer greater variations in location, in relative size, and in shape.

In the gavial the nasals are far removed from the nares; the same is true in chameleons. In porpoises, according to Mivart, they occur as "small, rounded masses, each lying in a concavity on the frontal bone, and not at all roofing the nasal passages."

Even in a given species wide variations occur. Here are skulls of the lion (Fig. 4, *n*) and of the tiger (Fig. 4, *m*). Holden, in a note on the comparative osteology of the nasals (*Human Osteology*, seventh London edition, p. 106), says: "The only difference between the skulls of a tiger and a lion is that in the lion the upper

Fig. 12.

ends of the nasal bones and the nasal processes of the superior maxillary bones are on the same level, whereas in the tiger the nasal bones run up considerably beyond the nasal processes."

This is well shown in the skulls before you. But were this the only distinction, the osteologist would often be in a quandary, as more than once in *known specimens* of the two skulls have we found the limits of he nasals absolutely identical.

I had intended to touch briefly upon the weight of the nasal bones as found in man and in mammals generally, but time has not permitted the assemblage of certain proposed data.

In twelve European skulls examined, the weight of the right nasal varied from thirty centigrammes in an adult woman to one hundred and thirteen centigrammes in another adult woman. In seven cases the right nasal was the heavier; in one, a female of twenty years, they were equal; in four the left were the larger.

Greatest variation, thirty five centigrammes (right) and twenty centigrammes (left) respectively in a skull estimated at nineteen to twenty years. Tabulating these weights in two series, one repre-

senting adults (over twenty-one years), the other series all under twenty-one years, we find, as would be expected, a preponderance of size in the older bones. Thus, of five adult skulls, the average weight of the right nasal is $75\frac{1}{5}$ centigrammes; of the left, $68\frac{2}{5}$ centigrammes. In a very ancient cliff-dweller skull from New Mexico the nasals weighed respectively, right, seventy-four centigrammes; left, seventy centigrammes. Of the seven younger skulls (none of them under fifteen years) the average weight of the right nasal

1 2

Fig. 13.

is $42\frac{2}{7}$ centigrammes; of the left, $43\frac{1}{7}$ centigrammes. In other words, while the average weight of the two nasals is $85\frac{3}{7}$ centigrammes in the young series, in the adults it is $143\frac{3}{5}$, an additional growth of more than sixty-eight per cent. by weight *occurring after puberty.*

Of the adults, both the heaviest and the lightest nasals found were those of *women.*

The proportional weight of both nasals to the entire skull as found for seven specimens was—

Young Series.					*Adult Series.*	
$\frac{1}{702\frac{1}{3}}$,	$\frac{1}{702\frac{1}{3}}$,	$\frac{1}{1091}$,	$\frac{1}{640}$,	$\frac{1}{328}$	$\frac{1}{975}$,	$\frac{1}{386}$

Truly a wide divergence. Note, however, that in both series those having largest nasals in proportion to skulls are male.

These figures will, of course, be modified by future results.

Mankind has been classified according to color, geographical distribution, ancestry, language, hair, shape of skull and of buttocks, protrusion of jaw, height, political complexion, and religious faith.

Professor Flower has introduced a dental index to the scientific world, which seems much more exact in its results than many of the indexes heretofore in vogue. To Dr. Paul Broca, the distinguished French anthropologist, do we owe the use of the proportion between the maximum width and height of the skeletal nose as a classific concept. His method is as follows: The greatest width of the anterior nares, multiplied by a hundred, is divided by the distance from the anterior spine to the centre of the naso-frontal suture. The resultant nasal index varies in Broca's tables from 35·71 (Russian) to 72·22 (Bushman, Africa). Three natural groups are demonstrated: The *leptorrhini* (thin-nosed), index 42 to 48; *mesorrhini* (medium-nosed), index 48 to 53; and the *platyrrhini* (broad-nosed), index 53 to 58 and above.

The white race, with the Eskimos, comprise the first group; the Mongols and aboriginal Americans the second; and the black races the third.

Some of these forms are here shown. This fragment (No. 1, Fig. 12) is from a European woman, and presents the extraordinary nasal index of 30·9. Broca's lowest recorded index is the Russian, 35·71. Here is another leptorrhine skull, that of a mulatto girl, eighteen years of age (No. 3, Fig. 12). "But the negro is platyrrhine," you protest. Granted. Yet, as a rule, the *father* of a mulatto is a white man and leptorrhine. Granting this and the further postulate that *girls* usually resemble the father, and *vice versa*, and we find her apparently contradictory nose accounted for. In this *male* mulatto (No. 4, Fig. 12) from the same locality, the entire skull is markedly negroid, while the nasal index reaches 50, throwing it into the mesorrhine division. Of platyrrhine skulls we have but one or two; this Micronesian, a native of New Ireland (No. 5, Fig. 12), is a good example, while this one (No. 1, Fig. 13) shows, in addition to the typical nose, a sabre cut cleanly dividing the nasals. (No. 2, Fig. 13, shows an abscess of both antrum and nares.)

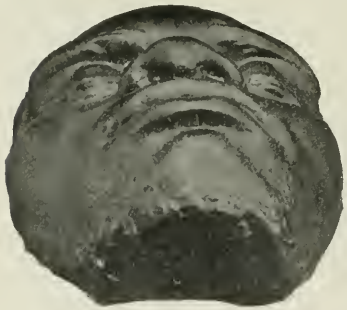


Fig. 14.

So far we have made only post-mortem measurements. The *vivo-nasal index* accomplishes the same end for the living, the greatest width between the alæ now creeping in. We consequently

obtain much higher indices and different limits are given to each class.

Still another index, the antero-posterior, is determined thus: width : projection anteriorly :: × : 10. The anterior projection of the nose is generally in an inverse ratio to the width. Topinard enumerates the following essential points of ethnic variation of the nose:

- Maximum height, " breadth — transverse index.
- " projection — antero-posterior index.
- Lobule: distinct (pinched, trilobed varieties). non-distinct. extending beyond the nares.
- Alæ: near together. divergent.
- Nostrils:
  - Shape: elliptical. round. special.
  - Their plane looking: downward. forward. outward. backward.
  - Direction of their axis: antero-posterior. oblique. transverse.
- Bridge:
  - Its angle of inclination.
  - Direction: rectilinear. bent or dinted. convex (aquiline). concave (retroussé).
  - Shape: like a roof. rounded off. broad and flat.

Let us examine a single point, the direction of the axis of the nostril. Elliptical and nearly parallel from before backward in the purest white types, a gradual thickening of the posterior border of the nasal septum occurs as we descend the scale, and, as pointed out by Topinard, the nostrils, from being placed anteriorly, become transverse.

This is well shown in this mask of the head of a Tasmanian (Fig. 14), a copy, by the way, of that in the Government Museum of Hobart Town, a death-mask of the last representative of this interesting race, who died in 1876.

The nostrils, being in relation with the inferior border of the anterior nares, may reasonably be supposed to share with this region any peculiar ethnic features. To a considerable extent this is true. The skulls of all colored races are distinguished from those of whites by having this inferior border rounded; the nasal spine is also much

reduced in size, smooth and blunt, both of which are marked simian characteristics, the nasal spine in particular being found only in man. I have here skulls of adult mulatto (1) and white (2) women, also skulls of negro (3) and of white child (4) at birth, in all of which these points are well shown (see Fig. 15).

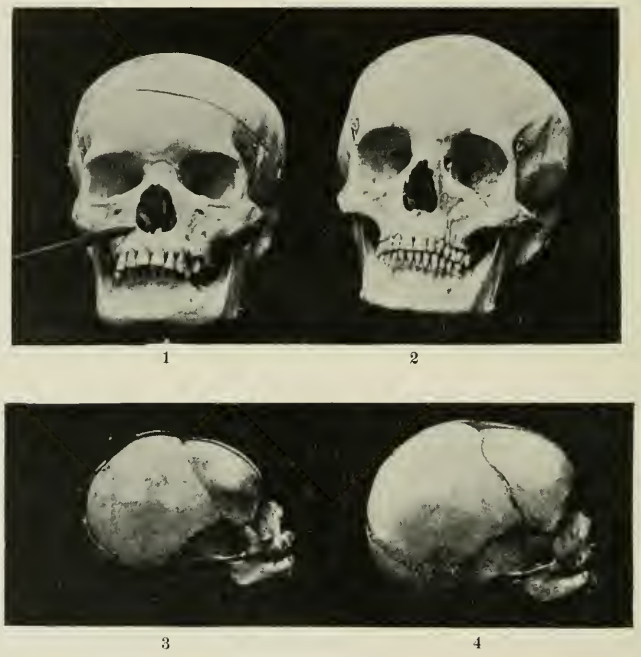
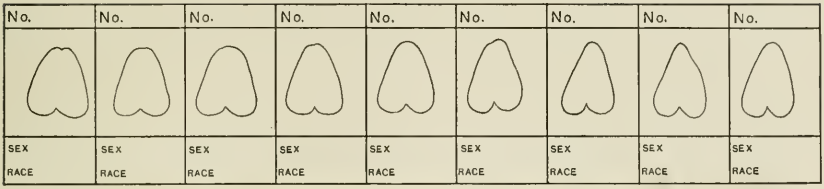


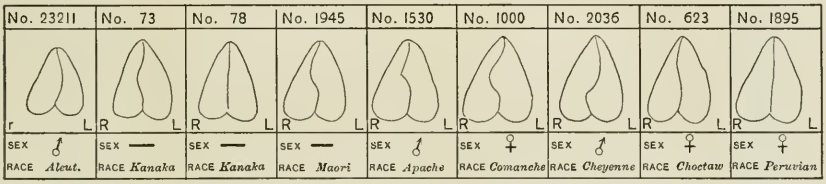
Fig. 15.

My own observations on the deflection of the nasal septum, not yet tabulated, extend over about three hundred specimens.

The following diagrams were sent last Friday and Saturday to Washington and to New York. It seemed a saving of time to outline the anterior nares; then, in making the record, the septum is simply drawn in as it appears when *facing* the skull. Keeping in mind that for this reason the inflections are all reversed, this chart, filled in in two or three hours (through the courtesy of Mr. Frederic A. Lucas, curator of comparative anatomy of the United States National Museum), represents the condition of pretty nearly all the septa in the Army Medical Museum at Washington. A section only of the blank and of the filled forms is shown in Fig. 16. On the



Section of Nasal Septum Chart. (reduced.)



Same chart filled in. From skulls in Army Medical Museum.

R=*Right side* Nos. *are those of specimens.*
L=*Left side* SEX *indicated in the usual way.* ♂ (*Mars*)=*male*, ♀ (*Venus*)=*female.*

Fig. 16.

original chart about fifty septa were figures. Printed forms, filled in this way, express the condition of affairs fairly well, besides giving number of specimen, sex, and nationality.

And now, gentlemen, let me thank you for your kind attention.

Presentation of Instruments.

AN IMPROVED CONCHOTOME.

By Dr. J. W. GLEITSMANN.

DR. J. W. GLEITSMANN, of New York, presented an improved conchotome. Unlike all previous instruments of this kind that had been devised for the removal of the middle turbinated body, it did not open and close in a vertical direction. The fact that the longest diameter of the middle turbinated was vertical, and the shortest one horizontal, had suggested to him the plan of having the instrument constructed so as to cut horizontally by the insertion of its blades on each side of the turbinated. In this way the instrument could be pushed to almost any desirable depth with one branch between the septum and turbinated, and with the other between the latter and the outer wall. A separate instrument was necessary for each nostril, as the cutting blade was intended for introduction on the outer part of the turbinated. As large pieces could be removed with this conchotome at each insertion of the instrument, the operation could be done very quickly. The instrument had been made for him by Tiemann & Co., of New York.

MOUTH-BREATHERS.

By Dr. J. W. FARLOW.

DR. J. W. FARLOW, of Boston, exhibited a picture of Ferdinand I, Emperor of Germany, painted in 1524, when the emperor was twenty-one years of age, a copy of the picture in the Uffizzi Gallery in Florence by Lucas de Leyden.

From the pinched, narrow nose with small nostrils, the open mouth, and the fullness of the glands of the neck there could be no question that adenoid disease existed long before the nineteenth century.

Dr. Farlow said that he had sent for another photograph which he would present to the society library.

Dr. Farlow also showed an instrument devised by a firm in Bridgeport, for mouth-breathers to wear in the mouth during sleep. It consisted of a soft rubber plate to go between the lips and the teeth, with aluminum projections from the rubber to go outside the lips and prevent the plate from getting inside the teeth during sleep.

Dr. Daly said that in a recent private letter from Wilhelm Meyer, of Copenhagen, Denmark, now over seventy years of age, he said that he had recently made a pilgrimage all the way to Rome in order to search the galleries and ancient statuary for evidences of mouth-breathers. He was sure that Wilhelm Meyer,* of Copenhagen, would be very glad to receive a photograph of this painting. To this man must be given the credit of having kept this matter of mouth-breathing for years before the profession, and its cause in pharyngeal adenoids.

A MODIFICATION OF THE GRADLE FORCEPS.

By Dr. MORRIS J. ASCH.

DR. MORRIS J. ASCH, of New York, presented a modification of the Gradle forceps. This instrument, he said, had been the most satisfactory in his experience, except that some cases required a different angle of the instrument. The curette worked well, but sometimes produced bad results. More than once he had seen severe septic and neurotic symptoms follow its use. His modification of the Gradle forceps consisted in hinging it so that the cutting portion could be placed at any desired angle while the parallelism of the blades was maintained.

BORS'S LARYNGEAL DILATOR.

By Dr. MORRIS J. ASCH.

DR. ASCH also presented an instrument for producing forced dilatation of the larynx. The tube was like that of O'Dwyer's instrument, and had a hollow introducer. In cases of membranous laryngitis, the inventor of this instrument, Dr. Louis Bors, of Buda Pest, made forced dilatation two or three times a day, and claimed that this would take the place of permanent intubation. The tube itself was like a hinged trivalve speculum. By means of a screw the desired amount

* While I correct the proof of this discussion, a letter comes to me from Mrs. Wilhelm Meyer, dated Copenhagen, June 17, 1895, saying Dr. Wilhelm Meyer died in Venice on the 3d of June, 1895, of fever supposed to be typhoid. The entire medical world will unite in a deep sense of regret at this sad intelligence.

of dilatation was effected. Dr. Bors had used this instrument with satisfaction in a few cases of membranous laryngitis.

Dr. Asch also showed in this connection, devised by Dr. Bors, an improved mouth-gag.

Dr. Shurly thought it incredible that any dilatation carried on for a few minutes at a time, in cases of membranous laryngitis, could produce a favorable effect. He could not see that this was any better than introducing the old-fashioned brush or catheter.

Dr. Asch replied that it had been claimed by Dr. Bors that this dilatation caused a loosening of the false membrane, and so favored its expulsion.

Dr. Gleitsmann said that he had examined Dr. Bors's instruments several weeks ago, and that the doctor had shown him a description of his instruments in German, which he understood would be published in the *New York Medical Journal* before long, when the method would be better understood.

Dr. W. K. Simpson, of New York, said that there could be no doubt that any dilating intubation tube for the treatment of cicatricial stenosis in the adult would be very welcome, but he felt that this instrument just presented would not be satisfactory in acute stenosis of children. Here we desired to avoid frequent introductions of the instrument, especially in the beginning of the stenosis. It did not seem to him that temporary dilatation in acute cases could be effectual. Dr. O'Dwyer had caused to be made a set of short and very large circular tubes to be used for the expulsion of the membrane and small foreign bodies, and intended only to be retained for a short time.

Dr. Asch said that the idea was that the instrument should be retained for from three to five minutes, during which time dilatation would be performed. The introducer was hollow, so as not to interfere with the breathing.

Dr. Jonathan Wright thought the instrument would be useful in chronic syphilitic stenosis.

A NEW SPRAY CUT-OFF.

By Dr. SHURLY.

DR. SHURLY: I wish to speak to you of a "cut-off" for use with compressed air, which is the invention of my friend, Dr. Mills, of Port Huron, Mich. I think Dr. Ingals, and, perhaps, some others here have used it and can speak of its efficiency. The improved feature of this over the other "cut-offs" in the market consists in an extra check valve which allows the imprisoned air to instantly escape, and thus stops the spray at the very moment that the lever is loosened by the

thumb or finger. The doctor manufactures it with either an overhanging or horizontal lever, for manipulation by either the thumb or finger, as the operator may desire. I have used one for some time and can highly recommend it.

Dr. Ingals said that this cut-off was a most admirable one. It was the simplest and most effectual cut-off that he had seen.

Dr. Asch remarked that he had used for a number of years a form of cut-off in which the air was controlled by a conical plunger operating in a straight tube with the aid of a spring.

INSTRUMENTS FOR USE IN INGALS'S OPERATION ON DEVIATED SEPTUM.

By Dr. WILLIAM H. DALY.

DR. WILLIAM H. DALY said that some years ago an interesting paper had been presented by Dr. Ingals on an operation for remedying deviations of the septum. The first time that he had attempted it, the operation had consumed about three and a half hours. The result of the operation had been successful, but the technique of the operation had been very tedious. The first step of the operation was to cocainize the part thoroughly, and the next was to make an incision into the mucous membrane, and put it back out of the way. In order to facilitate this last step, he had had the instrument-maker construct a small spud for elevating and rolling back the mucous membrane, and by means of a small hoelike instrument the anterior corners of the mucous membrane could be easily drawn forward out of the way.

Dr. Ingals said that his operation had been referred to as occupying three hours or more, but that it should not take more than twenty minutes. He now used Sajous's knife, with which he cut through the mucous membrane and pulled it off the underlying cartilage or bone. With the same knife he had been able to cut through the cartilage without perforating the membrane on the other side, this result being favored by cutting the cartilage obliquely. He thought it probable that a knife made with a small projection about a sixteenth of an inch from the edge, to prevent perforation of the membrane on the other side, would be an improvement, but he had never tried such an instrument.

If he found difficulty in keeping the cartilage in place after it had been straightened, several trephine openings about a sixteenth of an inch in diameter were made from in front backward, as far as possible beneath the mucous membrane, to reduce the resiliency, after which the parts were kept in place by a gutta-percha tube or a tampon of surgeon's lint.

AN IMPROVED CARTILAGE KNIFE.

By Dr. A. COOLIDGE, Jr.

DR. A. COOLIDGE, Jr., of Boston, exhibited a knife with the blade turned at right angles. It was a rounded bistoury, sharp on the lower side only.

Dr. Coolidge also presented an instrument for those cases in which the soft palate had become adherent to the posterior pharyngeal wall. It was a dilator, and was made to order of a size best suited to the individual case. It was intended that the patient should pass this instrument at home every day.

A CONVERTER FOR THE ALTERNATING CURRENT.

By Dr. J. C. MULHALL.

DR. J. C. MULHALL, of St. Louis, exhibited a converter of the alternating current, intended to be used for galvano-caustic purposes. Its cost was twenty-five dollars. He had found it absolutely perfect. It was made by A. S. Aloe & Co., of St. Louis.

A MULT-AURAL STETHOSCOPE.

By Dr. J. H. LOWMAN.

DR. J. H. LOWMAN, of Cleveland, described a modification of the ordinary binaural stethoscope, intended to demonstrate to several persons at one moment any particular sign heard during auscultation. The sounds could be well demonstrated to six or eight persons at the same moment, this latter being made possible by having a number of separate rubber tubes connected with the shaft of the stethoscope.

BUSINESS MEETINGS.

The Seventeenth Annual Congress of the American Laryngological Association was convened by the President, Dr. Roe, at the Chamber of Commerce, Rochester, N. Y., on Monday, June 17, 1895, at 10.30 A. M. There were present during the session the following Fellows:

John O. Roe, Rochester, President.
S. Hartwell Chapman, New Haven, Second Vice president.
W. K. Simpson, New York, Secretary *pro tem.*
S. W. Langmaid, Boston, Member of Council.
M. J. Asch, New York, Member of Council.
J. H. Bryan, Washington, Librarian.
F. H. Bosworth, New York.
W. E. Casselberry, Chicago.
A. Coolidge, Jr., Boston.
William H. Daly, Pittsburgh.
J. W. Farlow, Boston.
J. W. Gleitsmann, New York.
F. W. Hinkel, Buffalo.
E. Fletcher Ingals, Chicago.
J. H. Lowman, Cleveland.
J. C. Mulhall, St. Louis.
T. M. Murray, Washington.
J. E. Newcomb, New York.
Carl Seiler, Philadelphia.
E. L. Shurly, Detroit.
H. L. Swain, New Haven.
A. B. Thrasher, Cincinnati.
Jonathan Wright, Brooklyn.
J. E. H. Nichols, New York.

The President announced that owing to the sickness of the secretary, Dr. C. H. Knight, and his enforced absence, it would be necessary to elect a secretary *pro tem.* On motion, Dr. W. K. Simpson was elected to this position.

The President, after delivering his address, declared the congress open.

After the regular scientific proceedings the Association went into executive session. The following candidates, having been proposed in due form by the Council, were then elected by written ballot to fellowship in the Association: J. E. Boylan, M. D., Cincinnati, Ohio, proposed by Dr. Thrasher and Dr. Daly. Thesis—Herpes Chronica Pharyngis. F. E. Hopkins, M. D., New York, proposed by Dr. Asch and Dr. C. H. Knight. Thesis—Œdema of the Larynx, with Report of a Case. Thomas Hubbard, M. D., Toledo, Ohio, proposed by Dr. Delavan and Dr. Wright. Thesis—The Treatment of Acute Laryngitis. J. E. H. Nichols, M. D., New York, proposed by Dr. Simpson and Dr. Newcomb. Thesis—The Intranasal Causes of Headache.

The President then appointed Dr. E. F. Ingals and Dr. M. J. Asch to serve as an Auditing Committee.

The Nominating Committee was then elected—viz., Dr. T. M. Murray, Dr. E. F. Ingals, Dr. E. L. Shurly, Dr. J. E. Newcomb, and Dr. W. E. Casselberry.

On Monday afternoon the Society was invited to attend a lecture on Nasal Characteristics, Human and Comparative, by Mr. Charles H. Ward, and at its close it was voted to thank Mr. Ward for his most interesting discourse, and that his paper be published in the *Transactions* of the Association.

At the business meeting of the second day the following reports were read and adopted:

Secretary's Report, 1895.

The Secretary, after presenting the Association with the bound volume of the *Transactions* for 1894, reported that the Association had during the year lost none of its members, and that one meeting of the Council had been held, the minutes of which were then read and approved.

Treasurer's Report, 1894–'95.

Receipts.		
Balance from 1894 account	$222 89	
Dues, 1893	5 00	
Dues, 1894	25 00	
Dues, 1895	285 00	
Assessment, 1893	10 00	
Transactions, 1892	16 50	
Transactions, 1893	42 59	
Transactions, 1894	12 50	
		$619 39
Disbursements.		
D. Appleton & Co., *Transactions*, 1893	$287 85	
Printing	3 10	
Stenographer, 1894	62 85	
Congress of Physicians and Surgeons, 1894	36 60	
Programmes, 1895	30 95	
Postage	10 92	
Stationary	17 20	
Printing	15 21	
		$464 68
	$619 39	
	464 68	
Balance to credit	$154 71	

E. Fletcher Ingals, Morris J. Asch, } *Auditing Committee.*

Librarian's Report.

The Librarian has to report that no additions have been made to the library since the last report, the total number of volumes being 1,022.

Respectfully submitted,

J. H. Bryan, *Librarian.*

Report of Committee on Disposition of Instruments.

The report, as amended and adopted, reads:

1. That each Fellow be requested to furnish the Librarian of the Association with a sample of any instrument or apparatus which he may previously have offered to the Association, properly labeled with its name and date of construction, as well as the name and date of the journal where published.

2. That hereafter all instruments and appliances presented to the Association be considered the property of the Association, and should be handed to the Librarian for future care and preservation.

3. That a proper case capable of transportation be constructed, and the collection exhibited at each triennial meeting of the Association, which will be held in Washington, D. C., in conjunction with the Congress of American Physicians and Surgeons.

In this way the latest improvements and suggestions may be noted by the Fellows, and the historical value be increased from year to year, and thereby be of instruction and profit to each Fellow, and so redound to the honor and credit of this Association.

Very respectfully,

W. Peyre Porcher,
J. H. Bryan, } *Committee.*

The Committee on Nominations reported the following names for officers for 1895–'96:

President.—William H. Daly, Rochester.

First Vice-president.—Jonathan Wright, Brooklyn.

Second Vice-president.—A. W. de Roaldes, New Orleans.

Secretary and Treasurer.—Henry L. Swain, New Haven.

Librarian.—J. H. Bryan, Washington.

Member of Council.—John O. Roe, Rochester.

Dr. Charles H. Knight had sent a request that his name be not presented again for the position of secretary.

The committee recommended that the next place of meeting should be Pittsburgh, Pa.

On motion of Dr. F. H. Bosworth, the matter of appointing a delegate and alternate to the Congress of Physicians and Surgeons for 1897 was referred to the Nominating Committee.

The Secretary announced that owing to the deficit in the funds necessary for publishing the *Transactions*, it came to pass that about once in three years it was necessary to ask for an extra assessment of

five dollars upon each member, the Association having decided this method to be more preferable than increasing the regular yearly dues. Such action was then taken.

The Secretary then read a communication from the British Laryngological Association. On motion, the Secretary was instructed to communicate to the Association the thanks of this Society for the invitation, and to express the belief that a number of the members would attend their meeting.

On motion, Dr. Delavan, Dr. Gleitsmann, and Dr. McKenzie, together with any other members who could attend, were chosen delegates to the British Laryngological Association. The Secretary was instructed to furnish the necessary credentials to such delegates.

In executive session on the third day, the Nominating Committee announced the selection of Dr. W. K. Simpson, of New York, as delegate, and Dr. J. H. Bryan, of Washington, D. C., as alternate, to the next Congress of American Physicians and Surgeons.

By unanimous consent the Secretary was instructed to cast a ballot for the officers proposed by the Nominating Committee.

It was voted to appoint Dr. T. M. Murray as the representative of this Association on the Committee of Arrangements for the next Congress of American Physicans and Surgeons.

The place of the next meeting was chosen as Pittsburgh.

After the usual installation ceremonies for the newly elected officers, it was voted that the Association tender its hearty thanks to Dr. W. K. Simpson for his efficiency as Secretary *pro tem.*

After having in the heartiest manner voted its thanks to Dr. Roe, the Association directed the Secretary to acknowledge the courtesy shown the Association by the Chamber of Commerce, The Genesee Valley Club, Mr. Powers, and Mrs. Kimball.

After some fitting remarks concerning the great care and faithfulness which Dr. Knight had shown in getting the work of the Association into such perfect order for use during the present session, notwithstanding his sickness and great suffering, the Association voted that the Secretary be directed to inform Dr. Knight of its deep regret at his absence and sickness, and to thank him for his excellent and faithful work as Secretary of the Association.

The Congress was then declared adjourned.

OBITUARY.

WILLIAM CHAPMAN JARVIS, M. D.

Dr. W. C. Jarvis died at Willett's Point, N. Y., on July 3, 1895, after patiently struggling with a lingering illness which was almost hopeless from the start, and which was rendered the more fatal if not produced by the life of intense professional activity which he ever zealously pursued.

He was born at Fortress Monroe, Va., on the 13th of May, 1855. He lived here until 1862, when the family moved to Baltimore, where he received his earlier education, and later took up the study of medicine in the Medical Department of the University of Maryland, obtaining his right to a diploma at the age of twenty years. The next year was taken up with a course of study in chemistry and biology at Johns Hopkins.

In 1877 he went to New York, and, after practicing general medicine for a year, decided to devote his energies entirely to the specialty of laryngology. That he was successful in that line of work a glance at his brilliant record abundantly demonstrates, and we, who personally know more of his career, can not but admire the courage and ability of a man who, coming to New York almost an entire stranger, was able, against the odds which were before him, not only to win for himself fame as a physician, but within six years to be called to occupy the chair of laryngology in the University of New York. This latter honor, we are told, was purely the outcome of his own labor, in recognition of which the call was given him by men who were practically strangers to him in every other way than from a professional standpoint.

However, he was to win fame far wider-reaching even than this notable academic honor, for his inventive genius was ever active in devising new and useful additions to the laryngologist's armamentarium, and to him thousands of patients the world over are yearly indebted for the comfortable way in which they are operated upon, for many of the instruments are his direct invention, and many more the outcome of suggestions due to him. One has but to have been the victim, for example, of the older methods of removing nasal polypi and then later to have the operation done with a Jarvis snare to realize how great a debt we owe to the inventor, and how lasting a monument he has reared to himself by this one idea expressed in this delightful instrument which we daily use. Later on, when the use of cocaine so immensely enlarged upon the possibilities of nasal surgery, a great demand arose for new instruments to meet the new emergencies constantly arising in the performance of new operations. Here his inventive genius had a wider latitude for work, and one improvement followed closely upon the other,

until the nasal trephine became perfected to its present status. Thus we have the trephine, the tubular drill, the tubular scissors, the protected burr and trephine, and an electric saw, among others, which he was instrumental in producing. Almost every instrument he used he modified to suit his own ideas, and these modifications have been eagerly adopted by those who learned of them.

And yet, while enjoying the recognition of the results of his labors, as it falls to the lot of but few men to see in their own lifetime, he was ever modest and never forward in placing the claim of his inventions in a flaring way before the public, but, in the true spirit of scientific progress, as often as he conceived that he had accomplished any new achievement which might in any way be helpful to any one else, lay or professional, he freely gave the medical world the benefit of his work, often disparaging the originality which characterized it.

On the other hand, while zealously at work in his specialty, he did not forget to keep up with the front in all lines of scholarly or professional activity, keeping himself in touch with the best ideas in many lines, knowing that a narrow outlook narrows all conceptions in medicine as in Nature. This was further evidenced, for example, in his efforts to found the New York Academy of Anthropology. His literary efforts were numerous and are well known, partaking in every way of the man who made them, being replete with valuable suggestions to the younger man and operator, yet never trite to the older and more experienced.

In the midst of this life of boundless activity, with the honor due him plainly in evidence from the appreciative way positions of trust were opened to him, with the endless possibilities which the surgery of the present day opens under the star of genius, at an age when one's powers naturally are ripening, as matured by previous knowledge in the light of present experience, to do the best work of one's lifetime, he was afflicted by serious disease, and gradually the lamp, burning dimly, went out.

We who have known him better have lost a staunch comrade and helper; from our Association, a personal friend and adviser; the world, a mind full of ideas to lessen the labor of the profession, to heighten and enlarge the possibilities of advancing medicine and surgery; and the public in general, a kind and sympathetic medical adviser, a brilliant and skillful operator, a much-beloved and lovable Christian gentleman. H. L. S.

1896.

ACTIVE FELLOWS.

Allen, Harrison, 1933 Chestnut Street, Philadelphia, Pa.
Asch, Morris J., 5 West Thirtieth Street, New York.
Bean, C. E., Germania Life Building, St. Paul, Minn.
Birkett, Herbert S., 123 Stanley Street, Montreal.
Bliss, Arthur Ames, 1832 Race Street, Philadelphia, Pa.
Bosworth, Francke H., 26 West Forty-sixth Street, New York.
Boylan, J. E., 319 Broadway, Cincinnati, O.
Brown, M. R., 34 Washington Street, Chicago, Ill.
Bryan, J. H., 818 Seventeenth Street, Washington, D. C.
Casselberry, William E., 34 Washington Street, Chicago, Ill.
Chapman, S. H., 193 Church Street, New Haven, Conn.
Cohen, J. Solis-, 1431 Walnut Street, Philadelphia, Pa.
Cohen, S. Solis-, 219 South Seventeenth Street, Philadelphia, Pa.
Coolidge, A., Jr., 1 Exeter Street, Boston, Mass.
Daly, William H., 135 Fifth Avenue, Pittsburg, Pa.
DeBlois, T. Amory, 372 Marlborough Street, Boston, Mass.
Delavan, D. Bryson, 1 East Thirty-third Street, New York.
Farlow, J. W., 234 Clarendon Street, Boston, Mass.
French, Thomas R., 150 Joralemon Street, Brooklyn, N. Y.
Glasgow, William C., 2847 Washington Avenue, St. Louis, Mo.
Gleitsmann, J. W., 46 East Twenty-fifth Street, New York.
Hartman, J. H., 5 West Franklin Street, Baltimore, Md.
Hinkel, F. Whitehill, 274 Delaware Avenue, Buffalo, N. Y.
Hitchcock, Urban G., 51 West Twenty-ninth Street, New York.
Hope, George B., 34 West Fifty-first Street, New York.
Hopkins, F. E., 43 Northampton Street, Springfield, Mass.
Hubbard, Thomas, 205 Ontario Street, Toledo, O.
Ingals, E. Fletcher, 36 Washington Street, Chicago, Ill.
Ives, Frank L., 117 East Thirtieth Street, New York.
*Jarvis, William C., 142 Madison Avenue, New York.
Johnston, Samuel, 204 West Monument Street, Baltimore, Md.

* Deceased.

Knight, Charles H., 147 West Fifty-seventh Street, New York.
Knight, Frederick I., 195 Beacon Street, Boston, Mass.
Langmaid, Samuel W., 373 Boylston Street, Boston, Mass.
Lefferts, George Morewood, 6 West Thirty-third Street, New York.
Leland, George A., 669 Boylston Street, Boston, Mass.
Lincoln, Rufus P., 22 West Thirty-first Street, New York.
Lowman, John H., 441 Prospect Street, Cleveland, O.
MacCoy, Alexander W., 1417 Walnut Street, Philadelphia, Pa.
Mackenzie, John N., 605 North Charles Street, Baltimore, Md.
Major, George W., 82 Union Avenue, Montreal.
Mulhall, J. C., 3609 Lindell Avenue, St. Louis, Mo.
Murray, T. Morris, Seventeenth and H Streets, Washington, D. C.
Newcomb, James E., 118 West Sixty-ninth Street, New York.
Nichols, J. E. H., 4 East Forty-third Street, New York.
Park, W. H., 128 West Eleventh Street, New York.
Porcher, W. Peyre, 4 George Street, Charleston, S. C.
Porter, William, 3886 Washington Avenue, St. Louis, Mo.
Rankin, D. N., 85 Lincoln Avenue, Allegheny, Pa.
Rice, Clarence C., 123 East Nineteenth Street, New York.
Roaldes, A. W. de, 136 Gravier Street, New Orleans, La.
Robinson, Beverley, 37 West Thirty-fifth Street, New York.
Roe, John O., 28 North Clinton Street, Rochester, N. Y.
Seiler, Carl, 1204 Walnut Street, Philadelphia, Pa.
Shields, Charles M., Fifth and Franklin Streets, Richmond, Va.
Shurly, E. L., 32 Adams Avenue, W., Detroit, Mich.
Simpson, W. K., 952 Lexington Avenue, New York.
Swain, H. L., 232 York Street, New Haven, Conn.
Thrasher, A. B., 296 Walnut Street, Cincinnati, O.
Van der Poel, S. Oakley, 47 East Twenty-fifth Street, New York.
Wagner, Clinton, 19 East Thirty-eighth Street, New York.
Wagner, Henry L., 506 Sutter Street, San Francisco, Cal.
Watson, A. W., 162 North Twentieth Street, Philadelphia, Pa.
Wright, Jonathan, 73 Remsen Street, Brooklyn, N. Y.

HONORARY FELLOWS.

Garcia, Manuel, 1 Bentinck Street, Manchester Square, London, England.
* Mackenzie, Sir Morell, 19 Harley Street, W., London, England.

* Deceased

CORRESPONDING FELLOWS.

Browne, Lennox, 36 Weymouth Street, London, England.
De La Sota y Lastra, R., 7 Calle de Torqueros, Seville, Spain.
Desvernine, C. M., Cuba 52, Havana, Cuba.
Gouguenheim, A., 73 Boul. Hausmann, Paris, France.
Holden, E., 13 Central Avenue, Newark, N. J.
Krause, H., Neustädt. Kirch-Strasse 13, Berlin, Germany.
Labus, Carlo, Via St. Andrea 8, Milan, Italy.
Macintyre, John, 179 Bath Street, Glasgow, Scotland.
Massei, F., 4 Piazza Municipio, Naples, Italy.
*Meyer, Wilhelm, Nörrefarimagsgade 19, Copenhagen, Denmark.
Moure, E. J., 25 Cour du Jardin-Public, Bordeaux, France.
Sajous, C. E., 28 rue de Madrid, Paris, France.
Schroetter, Leopold v., Schwartzenberg-Strasse 8, Vienna, Austria.
Semon, Felix, 39 Wimpole Street, Cavendish Square, London, England.
Stoerk, Carl, Wallfischgasse 13, Vienna, Austria.
Whistler, W. McNeil, 28 Wimpole Street, Cavendish Square, London, England.
Wolfenden, R. Norris, 35 Harley Street, W., London, England.

* Deceased.